MODULE DESCRIPTION FORM

Module Information

Module Title	**Electrical A.C circuits**	**Module Delivery**	
Module Type	**base**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI216**		
ECTS Credits	٥		
SWL (hr/sem)	60		
Module Level	1	**Semester of Delivery**	2
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Zahraa Siddiq Yahya	**e-mail**	
Module Leader's Acad. Title	Lecturer assistant	**Module Leader's Qualification**	
Module Tutor	Zahraa Siddiq Yahya	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module		**Semester**	

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. To identify the basic concepts of energy storage elements. 2. To identify the basic of Alternating Current AC. 3. To understand and cover the basic AC circuit analysis methods and theorems.
Module Learning Outcomes	1. Explain the function of each element in AC Electrical circuits. 2. Use the basic circuit analysis methods to simplified the AC Electrical circuits. 3. Applying the appropriate analysis method to reach the aim in its simplest form.
Indicative Contents	Indicative content includes the following. Part A – energy storage elements: The capacitor; The Inductor; Analysis of RC-transient circuits; Analysis of RL-transient circuits; RLC transient circuits. [15 hrs] Part B - A.C. circuit analysis: the basic of Alternating Current AC; The Phasor equivalent circuit; series & parallel connections and equivalent impedance; Methods of Ac-circuit Analysis;

	superposition; Nodal & Mesh analysis; Thevenin's Theorem; Norton's Theorem; Power factor and average power in the sinusoidal Ac-circuits; Complex power; Series & parallel resonance. [35 hrs]

Learning and Teaching Strategies	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)ل	30	**Structured SWL (h/w)** ا	4

Unstructured SWL (h/sem)	30	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**60**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	The capacitor & The inductor
Week 2	Analysis of RC & RL -transient circuits
Week 3	Analysis of RLC transient circuits
Week 4	The basic of Alternating Current AC
Week 5	The Phasor equivalent circuit
Week 6	series & parallel connections and equivalent impedance
Week 7	Methods of Ac-circuit Analysis
Week 8	superposition
Week 9	Nodal & Mesh analysis
Week 10	Thevenin's Theorem
Week 11	Norton's Theorem
Week 12	Power factor and average power in the sinusoidal Ac-circuits
Week 13	Complex power
Week 14	Series & parallel resonance
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	**" Engineering Circuit Analysis"** By W. Hayt	Yes
Recommended Texts	**"Introductory Circuit Analysis"** By Boylested	Yes

Grading Scheme

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Computer science**			**Module Delivery**	
Module Type	**Base**			☐ **Theory** ☒ **Lecture** X **Lab** **Tutorial** **Practical** ☐ **Seminar**	
Module Code	**NVEEELI214**				
ECTS Credits	٤				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EI		**College**	NE	
Module Leader	Asmaa Nabeel		**e-mail**	**asmaa.khaleel@uoninevah.edu.iq**	
Module Leader's Acad. Title	Lecturer Assist		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	4/7/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	**General overview of personal computer architecture** **Computer peripherals, keyboard, screen, mouse, and storage media** **Computer busses, ports, interfaces** **Overview of MSDOS operating system** **MSDOS internal commands** **MSDOS external commands** **Introduction to computer languages** **Overview of windows operating system** **Windows desktop, changing settings, starting programs** **Creating, deleting, copying, moving, searching for files and folders** **Using my computer, my document, and help facility** **Using windows control panel** **Using the windows accessories paint, notepad, word pad, …..etc** **Setup applications to windows, remove applications from windows** **Connecting to the internet, using the windows explorer** **Using the Microsoft Word** **Using the Microsoft Excel** **Using the Matlab**
Module Learning Outcomes	1.Understanding the important components of the computer and its operating system. 2. Understanding the meaning of MSDOS operating system and its commands. 3. Understanding the windows operating system 4. Understanding the Microsoft office (word, power point, excel). 5. Understanding the high and low level languages 6. Learn about how the strings represented in C language. 7. introduction to matlab

Indicative Contents	1. explain the components of computer hardware and software 2.introduction to the types of computers 3. storage media 4. computer ports 5. computer networks and the types of it 6. the internal and external MSDOS commands 7. windows operating system 8. word office program 9.power point office program 10. Excel program 11. Matlab

Learning and Teaching Strategies

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)	125	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	65	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	190		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	٢, 4, 5,6	LO #1, 2, 10 and 11
	Assignments	1	10% (10)	14	LO # 3, 4, 6 and 7
	Projects / Lab.	٠	٠	٠	LO # 3, 4, 6 and 7, 5, 8 and 10

	Report	١	٢٠	١٤	
Summative assessment	**Midterm Exam**	١.5hr	30% (20)	10	LO # 1-4
	Final Exam	3hr	50% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**Introduction to** the part of computers in hardware and software ,computer types, storage media
Week 2	**Explain the computer ports , computer networks**
Week 3	**Introduction to MSDOS operating system and the internal commands of it**
Week 4	**External Ms DOS command , file and folder related commands and the editor**
Week 5	Windows operating system
Week 6	Windows orders(change the background, screen saver, resolution), change the status of files, printing files, copy and save of files, backups, Recycle bin ,compressing files, viruses
Week 7	Microsoft office word (creating new word file, bars , types and styles of fonts, copy and select of texts ,save of word file)
Week 8	MS WORD: spell checking, inserting symbols, add borders, change the document setup , insert table, page numbering, insert equations and effects)
Week 9	MS Power point:(how to design professional presentation, change the layout of presentation and background of it, numbering slides, insert charts , insert table and audio)
Week 10	MS Power point(insert an effect to the object in slide, transition between slides , grouping of objects, insert equation, copy ,save and printing the slides then how to start the presentation)
Week 11	MS EXCEL (getting started with excel, how to create a spreadsheet, copy and rename the work book, entering and deleting of data in sheet, insert and delete of rows& columns, selecting cells, adding border to sheet)
Week 12	MS EXCEL:how to write a formule in sheet, functions, summation of data in row or column ,average function, max& min functions, count& counta, round function, save and print the spread sheet
Week 13	Overview of High &Low level languages
Week 14	**Matlab**
Week 15	

Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1-15	The application of each part of the covered drawing subject theoretically and according to the weekly sequence of the curriculum in the AutoCAD laboratory **Note: By two hours a week**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	1.“**Computer Science”**	No
Recommended Texts	**2.''MATLAB Handbook”**	No
Websites	https://www.tutorialsmate.com/2021/12/parts-of-computer https://www.koenig-solutions.com/matlab-programming	

Grading Scheme

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Electrical D.C circuits**			**Module Delivery**	
Module Type	**base**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI215**				
ECTS Credits	5				
SWL (hr/sem)	60				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Zahraa Siddiq Yahya		**e-mail**		
Module Leader's Acad. Title	Lecturer assistant		**Module Leader's Qualification**		
Module Tutor	Zahraa Siddiq Yahya		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module		**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	4. To identify the basic concepts of DC Electrical Eng. circuits. 5. To understand how is the calculation of current, voltage, and power. 6. To understand and cover the basic DC circuit analysis methods and theorems.
Module Learning Outcomes	4. Explain the function of each element in DC Electrical circuits. 5. Use the basic circuit analysis methods and theorems to simplified the DC Electrical circuits. 6. Explain the different between transformation methods. 7. Applying the appropriate analysis method to reach the aim in its simplest form.
Indicative Contents	Indicative content includes the following. Part A – BASIC CONCEPTS: Voltage & current; Power & Energy; Dependent and Independent sources; Ohm's laws series & parallel connections; Delta- star connections and transformations. [15 hrs] Part B - D.C. Network Theorems: Source transformation; Linearity & superposition; Thevenin's & Norton's Theorems; Source transportation; source superposition; Nodal analysis; Mesh analysis. [35 hrs]

Learning and Teaching Strategies	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)ل	30	**Structured SWL (h/w)** ا	4
Unstructured SWL (h/sem)	30	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**60**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Voltage & current
Week 2	Power & Energy
Week 3	Dependent and Independent sources
Week 4	Ohm's laws
Week 5	series & parallel connections
Week 6	Delta- star connections and transformations
Week 7	Kirchhoff's Current & Voltage Laws (KCL), (KVL)
Week 8	Source transformation
Week 9	Linearity & superposition
Week 10	Nodal analysis
Week 11	Mesh analysis
Week 12	Thevenin's Theorem
Week 13	Norton's Theorem
Week 14	Max. power transfer
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	**" Engineering Circuit Analysis"** By W. Hayt	Yes
Recommended Texts	**“Introductory Circuit Analysis”** By Boylested	Yes

Grading Scheme

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Differentiation and Integration**			**Module Delivery**	
Module Type	**Support or related learning activity**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI206**				
ECTS Credits	**5**				
SWL (hr/sem)	**134**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Electronic Eng. Dep.		**College**	Electronics Engineering	
Module Leader	Hani M. S. Salman		**e-mail**	hani.mohamed@uoninevah.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	MSc	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	7. Gain proficiency in differentiating trigonometric function, inverse trigonometric function, hyperbolic function, natural logarithm, exponential function, and general exponential function. 8. Master differentiation techniques for various types of functions. 9. To learn how to sketch curves and to deal with the transcendental functions. 10. To increase the skills related to differentiation applications. 11. Develop a strong foundation in Integration of trigonometric function, inverse trigonometric function, hyperbolic function, natural logarithm, exponential function, and general exponential function. 12. Understand the concept of Application of the definite integral, including finding volumes of revolution, lengths of curves, and surface areas of revolution. 13. To learn the methods of Integration – Trigonometric Substitutions, Quadratics, Partial fractions, Integration by parts, and Further Substitutions. 14. Apply calculus principles to solve real-world engineering problems,

	developing problem-solving skills and the ability to apply calculus concepts to practical situations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	8. Understand the concept of differentiation as a rate of change and slope of the curve. 9. Understand the basic differentiation rules, chain rule, implicit differentiation, higher order differentiation, partial differentiation, Differentiation of trigonometric functions and Hyperbolic Functions. 10. Learn the applications of differentiation. 11. Solve Maximum and Minimum problems. 12. Learn how to Plot the Curve. 13. Learn Transcendental functions: graphs, and derivative. 14. Understand the concept of integration: types of integrals. definite integrals, infinite Integrals. Integration of trigonometric function, inverse trigonometric function, hyperbolic function, natural logarithm, exponential function, and general exponential function. 15. Apply definite integration to as areas between curves, volumes of revolution, length of the curve and surface area of revolution. 16. Learn Methods of Integration – Trigonometric Substitutions, Quadratics, Partial fractions, Integration by parts, and Further Substitutions. 17. Develop critical thinking and problem-solving skills by applying calculus.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Differentiation:</u> Definitions and notations, basic differentiation rules, chain rule, implicit differentiation, higher order differentiation, partial differentiation, Differentiation of trigonometric functions and Hyperbolic Functions: . Applications of differentiation – slope tangents and normal, rate of change, velocity and acceleration, maxima and minima and inflexion points, and Curve plotting. [16 hrs] Transcendental Functions – definitions, properties, graphs, derivative. [٤ hrs] <u>Part B – Integration:</u> Definitions and notations, types of integrals: definite integrals, infinite Integrals. Integration of trigonometric function, inverse trigonometric function, hyperbolic function, natural logarithm, exponential function, and general exponential function. [10 hrs]

	Application of the definite integral – areas between curves, volumes of revolution, length of the curve and surface area of revolution. [12 hrs] Methods Of Integration – Trigonometric Substitutions, Quadratics, Partial fractions, Integration by parts, and Further Substitutions. [16 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This module's major aim is to foster student engagement, improve critical thinking abilities, and promote collaborative learning. Interactive seminars, interesting tutorials, and exercises encourage active participation, allowing students to hone their critical thinking skills and apply engineering mathematics principles to problem solving. Furthermore, students collaborate on engineering mathematics issues, examine real-world scenarios, and explore the practical applications of the principles acquired through group activities, projects, and conversations. This method not only increases students comprehension of engineering mathematical concepts, but it also fosters cooperation, communication, and key interpersonal skills that will be useful in their future engineering activities.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem)	76	**Unstructured SWL (h/w)**	5

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**134**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	30% (30)	5 and 10	LO #1 #2 #3 and #4, #7, #8
	Assignments	1	10% (10)	12	LO #7 - #9
	Projects / Lab.	-	-	-	-
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction – Differentiation definitions and notations, review of basic differentiation rules, chain rule, and Implicit differentiation.
Week 2	Partial differentiation and higher order differentiation.

Week 3	Differentiation of trigonometric functions and Hyperbolic Functions. Applications of differentiation; slope, tangents and normal.
Week 4	Rate of change, velocity and acceleration, maxima and minima, inflexion points and Curve plotting.
Week 5	Transcendental Functions – definitions, properties, and graphs, derivative.
Week 6	Definitions and notations of integration, Types of integrals: definite integrals and infinite integrals. Integration of trigonometric function.
Week 7	Integration of inverse trigonometric function, hyperbolic function. Mid-term Exam.
Week 8	Integration of inverse trigonometric function, hyperbolic function, natural logarithm, exponential function, and general exponential function
Week 9	Application of the definite integral – areas between curves, volumes of revolution, length of the curve and surface area of revolution.
Week 10	
Week 11	
Week 12	Methods Of Integration – Trigonometric Substitutions, Quadratics, Partial fractions, Integration by parts, and Further Substitutions.
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	G. B. Thomas Jr., M. D. Weir, J. Hass, and F. R. Giordano, "Thomas' Calculus," 12th ed., Pearson, 2019.	Yes

Recommended Texts		
Websites	https://www.coursera.org/learn/introduction-to-calculus#syllabus https://www.edx.org/learn/calculus https://www.khanacademy.org/math/calculus-1	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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MODULE DESCRIPTION FORM

Module Information					
Module Title	**Digital Techniques**			**Module Delivery**	
Module Type	**Base**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**NEEM1223**				
ECTS Credits	**4**				
SWL (hr/sem)	**45**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	(Younis Saber Othman), (Noor Alhuda Saad Abbas)		**e-mail**		
Module Leader's Acad. Title	Lecturer Assistant		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	4/7/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. To learn new number systems and how to convert between them 2. To identify and learn the logic gates and Boolean algebra 3. How to minimize the Boolean functions using Boolean algebra and Karnaugh maps 4. To understand, draw, and identify the combinational logic circuits using the discrete logic 5. To understand, draw, and identify the combinational logic circuits using the MSI integrated circuits 6. To use the 3-varaiables and 4-varaiables Karnaugh map for Boolean minimization
Module Learning Outcomes	Students will be able to: 1. Learning new number systems and how to convert between them 2. Identify the logic gates and learn the Boolean algebra 3. Minimize the Boolean functions 4. Understand, draw, and identify the combinational logic circuits using the discrete logic and MSI integrated circuits 5. Identify and use the 3-varaiables and 4-varaiables Karnaugh map
Indicative Contents	**Indicative content includes the following:-** **NUMBER SYSTEMS:- [10 Hrs]** Decimal number system; Binary; Octal and hexadecimal number systems; Conversion from one number to another number system; Addition; Subtraction; Multiplication and division using different number system; Representation of binary number insignia-magnitude; Sign 1's Complement and align 2's complement notation; Rules for addition and subtraction with complement Representation; BCD; EBCDIC; ASCII; Extended ASCII; Gray and other codes. **LOGIC GATES AND BOOLEAN ALGEBRA:- [10 Hrs]** AND; OR; NOT; NAND; NOR; Ex-OR logic gates; Positive and negative logic; Fundamental concepts of Boolean algebra; De-murrage's laws; Principles of duality; Simplification of Boolean expressions; Canonical and standard forms for Boolean function; SOP and POS, forms; Realization of Boolean functions using only NAND and NOR gates. **BOOLEAN FUNCTION MINIMIZATION:- [10 Hrs]** Objectives of the minimization procedures; Karnaugh map method; The 3-Variable Karnaugh Map; The 4-Variable Karnaugh Map; Karnaugh Map SOP Minimization;

	Don't care conditions; Karnaugh Map POS Minimization; Converting Between POS and SOP Using the Karnaugh Map. **COMBINATIONAL LOGIC CIRCUITS USING DISCRETE LOGIC GATES:- [5 Hrs]** Parity generator and checker; Code converters; Majority circuits; magnitude comparator. **COMBINATIONAL LOGIC CIRCUIT USING MSI INTEGRATED CIRCUITS:- [10 Hrs]** Encoder; priority encoder; decoder; Multiplexer and demultiplexer circuits; Implementation of Boolean functions using decoder and Multiplexer; BCD to 7-segment decoder; Common anode and common cathode 7-segment displays; Random access memory; Read only memory and erasable programmable ROMS

Learning and Teaching Strategies

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)	45	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	45	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	90		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	1-14	LO #1-14
	Assignments	1	5% (5)	6	LO # 1-6
	Projects / Lab.	10 Lab	10% (10)	5-14	LO # 5-14

	Report	3	5% (5)	5-14	LO # 5-14
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	10	LO # 1-10
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**NUMBER SYSTEMS:-** Decimal number system; Binary; Octal and hexadecimal number systems; Conversion from one number to another number system; Addition; Subtraction; Multiplication and division using different number system; Representation of binary number insignia-magnitude; Sign 1's Complement and align 2's complement notation; Rules for addition and subtraction with complement Representation; BCD; EBCDIC; ASCII; Extended ASCII; Gray and other codes.
Week 2	
Week 3	
Week 4	**LOGIC GATES AND BOOLEAN ALGEBRA:-** AND; OR; NOT; NAND; NOR; Ex-OR logic gates; Positive and negative logic; Fundamental concepts of Boolean algebra; De-murrage's laws; Principles of duality; Simplification of Boolean expressions; Canonical and standard forms for Boolean function; SOP and POS, forms; Realization of Boolean functions using only NAND and NOR gates.
Week 5	
Week 6	
Week 7	**BOOLEAN FUNCTION MINIMIZATION:-** Objectives of the minimization procedures; Karnaugh map method; The 3-Variable Karnaugh Map; The 4-Variable Karnaugh Map; Karnaugh Map SOP Minimization; Don't care conditions; Karnaugh Map POS Minimization; Converting Between POS and SOP Using the Karnaugh Map.
Week 8	
Week 9	
Week 10	
Week 11	**COMBINATIONAL LOGIC CIRCUITS USING DISCRETE LOGIC GATES:-** Parity generator and checker; Code converters; Majority circuits; magnitude comparator.
Week 12	
Week 13	**COMBINATIONAL LOGIC CIRCUIT USING MSI INTEGRATED CIRCUITS:-** Encoder; priority encoder; decoder; Multiplexer and demultiplexer circuits; Implementation of Boolean functions using decoder and Multiplexer; BCD to 7-segment decoder; Common anode and common cathode 7-segment displays; Random access memory; Read only memory and erasable programmable ROMS
Week 14	
Week 15	
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 5-14	Introduction to KL-31001 DIGITAL LOGIC LAB Exp. 1: Logic Gates Exp. 2: NAND, NOR, XOR Gates Exp. 3: AND-OR-INVERTER(A-O-I) Circuits Exp. 4: Bit Parity Generator Circuits Exp. 5: Comparator Circuits Exp. 6: Decoder Exp. 7: Encoder Exp. 8: Multiplexer Exp. 9: Demultiplexer

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	**Digital Fundamentals** | Eleventh Edition Global Edition | by Thomas L. Floyd | Pearson Education 2015	PDF
Recommended Texts	**Logic and Computer Design Fundamentals** | Fifth Edition Global Edition | by Morris Mano • Charles R. Kime • Tom Martin | Pearson Education 2016	PDF
Websites	(Telegram Group and Google classroom)	

Grading Scheme

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.

Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Drawing**			**Module Delivery**	
Module Type				☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits					
SWL (hr/sem)	45				
Module Level	1		**Semester of Delivery**	2	
Administering Department			**College**		
Module Leader	Noor Yassar		**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Students will be able to: 1. Drawing engineering shapes manually and clearly, including the effective use of the computer-aided drawing program (AutoCAD). 2. Develop a solid understanding of the basic principles of engineering drawing, Included the ability to work with concepts, analytically, and visualize them and a functional understanding of how these ideas will manifest in the real world. 3. Determine the strategies to be used and the assumptions to be made. 4. Use both manual and computer approaches in drawing figures. 5. Develop the ability to use engineering tools flexibly and creatively. 6. Develop an integrated understanding of the AutoCAD module. 7. Developing their ability to communicate scientific ideas. 8. Develop expertise in experimental methodologies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	18. Understand and apply the basics of drawing types of lines. 19. Define, explain and apply engineering drawing operations. 20. Understand the basics of drawing an ogee curves 21. Understand and apply the basic idea of central projection theory. 22. Explanation of the central and parallel projection theory to understand the projection process. 23. Explain Different Views are Front View (FV), Top View (TV) and Side View (SV) FV is a view projected on VP. TV is a view projected on HP. SV is a view projected on PP. 24. Ability to draw using AutoCAD.
Indicative Contents	**Introduction to engineering drawing and its tools** Introduction and introducing students to the subject of engineering drawing, which includes Identification of engineering tools and how to use them.

المحتويات الإرشادية	**Engineering shapes and the arcs , lamina. , Dimensions:** - Various engineering operations: - - Drawing a straight line parallel to a known straight line - The division of the rectum into two halves - Angle division is known. - Drawing a straight line parallel to a known straight line from a point that does not belong to the known straight line. - Draw a tangent to a circle from a point that does not belong to it. - Draw a tangent to two contiguous circles from the outside. - Draw a tangent to two contiguous circles from the inside **Multi view projection** - Perpendicular Projection Theory of Objects: - Types of projections resulting from vertical projection and approved in the projection of various engineering objects - Front view - Side view. - Top view **Using AutoCAD** - Apply everything that has been explained in the manual engineering drawing on the AutoCAD program and drawing the three-dimensional models

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	45	**Structured SWL (h/w)**	3

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	55	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	20% (20)	5 and 10	LO #1, 2, 10 and 11
	Assignments	3	10% (10)	2 and 12	LO # 3, 4, 6 and 7
	Projects / Lab.	3	10% (10)	Continuous	All
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO # 1-4
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	Introduction and introducing students to the subject of engineering drawing, which includes identification of engineering tools and how to use them.
Week 2	Teach students how to apply and draw the following engineering operations: Drawing a straight line parallel to a known straight line, the division of the rectum into two halves, angle division and drawing a straight line parallel to a known straight line.
Week 3	Teach students how to draw a tangent to two contiguous circles from the outside, Draw a tangent to two contiguous circles from the inside
Week 4	Draw a tangent to one circle from the inside and the other from the outside and draw a tangent to a circle passing through a straight line.
Week 5	Multi view projection Perpendicular Projection Theory of Objects: • Types of projection in drawing and its practical importance
Week 6	Types of projections resulting from vertical projection and approved in the projection of various engineering objects: Front view, Side view ,Top view
Week 7	Mid-term Exam + Introduction to AutoCAD
Week 8	Apply everything that has been explained in the manual engineering drawing on the AutoCAD program and drawing the three-dimensional models
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1-15	The application of each part of the covered drawing subject theoretically and according to the weekly sequence of the curriculum in the AutoCAD laboratory

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	EGINEERING DRAWING AND GRAPHIC TECHNOLOGY", Fourteenth Edition, By: THOMAS E.FRENCH, CHARLES .VIERCK, ROBERT J.FOSTER,McGRAW-HILL	Yes
Recommended Texts	➢ William D.CallisterJr.&David D.Rethwisch.(2010)"Material Science and Engineering An introduction", eightEdition.	No
Websites	ENGINEERING DRAWING Any edition	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
(50 - 100)	**B -** Very Good	جيد جدا	80 - 89	Above average with some errors

	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics**			**Module Delivery**	
Module Type	**Support or related learning activity**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NEEI1222**				
ECTS Credits	٦				
SWL (hr/sem)	**134**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Electronic Eng. Dep.		**College**	Electronics Engineering	
Module Leader	Hani M. S. Salman		**e-mail**	hani.mohamed@uoninevah.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	MSc	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	NEEI1212	**Semester**	

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	9. To obtain a good knowledge of dealing with complex numbers. 10. Establish a strong foundation in matrices and their operations, determinants, and inverse matrices. This includes covering definitions, notations, properties, types, and basic operations on matrices, enabling effective application in problem-solving. 11. enhancing students' proficiency in matrix-based solutions for linear systems of equations using Cramer's rule, the inverse method, and the Gauss elimination method 12. To provide the students with the knowledge to deal with vectors and their mathematical operations. 13. To Learn about the polar coordinates, and the graphs of polar equations. 14. Apply calculus principles to solve real-world engineering problems, developing problem-solving skills and the ability to apply calculus concepts to practical situations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	25. Comprehend and utilize complex numbers within the Argand diagram, and 26. master complex number operations (Addition, subtraction, product, quotient, power, and roots) and De Moivre's Theorem. 27. Understand the concept of linear algebra and matrices. 28. Identify the types of matrices such as square matrices, zero matrix and identity. 29. Perform the common matrix operations such as addition, subtraction, scalar multiplication, and multiplication.

	30. Find the transpose of a matrix. 31. Compute the determinants. 32. Compute the inverse of the matrix. 33. Identify whether the matrix is invertible or singular. 34. Relate a matrix to a homogenous system of linear equation. 35. Solve a system of linear equations by matrices: using Cramer's rule. 36. Solve a system of linear equations by matrices: using the inverse method. 37. Solve a system of linear equations by matrices: using Gauss Elimination Method. 38. Identify the rank of the matrix and its relation to the solution of linear equations. 39. Find the eigenvalues and eigenvectors of a matrix. 40. Represent a vector in space. 41. Compute dot and cross products in vectors. 42. Understand the meaning of del operator, gradient, divergence, and curl and to compute the del operation, gradient, divergence, and curl. 43. Learn about the vector functions. 44. Convert from Cartesian to Polar coordinates and vice versa. 45. Sketch in polar system. 46. Utilize mathematical reasoning and critical thinking skills to analyze and interpret mathematical concepts and their applications in Electronics engineering. 47. Develop proficiency in mathematical problem-solving, both independently and collaboratively, and communicate solutions effectively.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Review of Complex Numbers:</u> The Argand diagram, Addition, Subtraction; Product, Quotient, power and roots, and Demoiver's Theorem. [4hrs] <u>Part B – Matrices and Determinants:</u> Matrices and Determinants: Definitions and notations, Properties, types of matrices, basic operations on matrices, computation of the determinants of matrices, properties of determinants. [8 hrs] Inverse of the Matrices. [4 hrs] Solution of the system of linear equations-solution of the system of linear equation using Cramer's rule, solution of the system of linear equation using the inverse

	method. [٨ hrs] Revision problem classes [2 hrs] solution of the system of linear equation using Gauss Elimination Method. [4 hrs] Revision problem classes. [2 hrs] Eigenvalues and eigenvectors [4 hrs] <u>Part C – Review of Vectors:</u> Representation of vectors in space (i;j;k), unit vectors, Scalar product, and Vector product. [8 hrs] <u>Part D – Vector Calculus:</u> Vectors – del operator, Parametric Equations of Lines in Space, the distance from a Point to a line in Space, plane equation in space, the Distance from the Point to a Plane, Angles Between Planes, vector function versus Scalar function, del operator, Gradient, Divergence and Curl. [12 hrs] <u>Part E – Polar Coordinates:</u> Polar coordinates – polar coordinate system, transformation between polar and Cartesian coordinates, graphs of polar equations. [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	This module's major aim is to foster student engagement, improve critical thinking abilities, and promote collaborative learning. Interactive seminars, interesting tutorials, and exercises encourage active participation, allowing students to hone

	their critical thinking skills and apply engineering mathematics principles to problem solving. Furthermore, students collaborate on engineering mathematics issues, examine real-world scenarios, and explore the practical applications of the principles acquired through group activities, projects, and conversations. This method not only increases students' comprehension of engineering mathematical concepts, but it also fosters cooperation, communication, and key interpersonal skills that will be useful in their future engineering activities.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	58	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	76	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**134**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	30% (30)	6 and 14	LO #1 - #11, #16- #19
	Assignments	1	10% (10)	13	LO #12-#15
	Projects / Lab.	-	-	-	-

	Report	-	-	-	-
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #12
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The Argand diagram, Addition, Subtraction; Product, Quotient, power and roots, and Demoiver's Theorem.
Week 2	Matrices and Determinants: Definitions and notations, Properties, types of matrices, basic operations on matrices, computation of the determinants of matrices, properties of determinants.
Week 3	
Week 4	Inverse of the Matrices.
Week 5	Solution of the system of linear equations-solution of the system of linear equation using Cramer's rule.
Week 6	solution of the system of linear equation using the inverse method.
Week 7	solution of the system of linear equation using Gauss Elimination Method.
Week 8	Revision problem classes, Mid-term Exam
Week 9	Eigenvalues and eigenvectors.
Week 10	Representation of vectors in space (i;j;k), unit vectors, Scalar product, and Vector product.
Week 11	

Week 12 **Week 13** **Week 14**	Vectors – del operator, Parametric Equations of Lines in Space, the distance from a Point to a line in Space, plane equation in space, the Distance from the Point to a Plane, Angles Between Planes, vector function versus Scalar function, del operator, Gradient, Divergence and Curl.
Week 15	Polar coordinates – polar coordinate system, transformation between polar and Cartesian coordinates, graphs of polar equations.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**"Higher Engineering Mathematics", 7th edition by John Bird**	No
	G. B. Thomas Jr., M. D. Weir, J. Hass, and F. R. Giordano, "Thomas' Calculus," 12th ed., Pearson, 2019.	Yes
Recommended Texts	**"Introduction to Linear Algebra". 4th edition by Strang, Gilbert** **"Linear Algebra for Everyone". 2020 by Strang, Gilbert** **Zill, D. G., Wright, W. S., & Cullen, M. R. (2011).** **Advanced Engineering Mathematics. Jones & Bartlett Publishers.**	No
Websites	https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010 https://www.khanacademy.org/math/linear-algebra https://www.ohio.edu/mechanical-faculty/williams/html/PDF/MatricesLinearAlgebra.pdf	

Grading Scheme

مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Physics of semiconductor**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI218**				
ECTS Credits	6				
SWL (hr/sem)	111				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EI		**College**	NE	
Module Leader	Hamsa Fawaz Thanoon		**e-mail**	hamsa.thanoon@uoninevah.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date	04/07/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module		**Semester**	

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. To develop problem solving skills and understanding of Atomic Structure 2. To understand Energy band structure of metal, insulator, and semiconductor. 3. To understand Properties of intrinsic P and N type semiconductors. 4. To understand Electrical conduction in intrinsic semiconductor. 5. To understand Properties of extrinsic semiconductors. 6. To understand Electrical conduction in extrinsic semiconductor
Module Learning Outcomes	1. Recognize how semiconductors works in electronics circuits. 2. List the various terms associated with electronics circuits. 3. Summarize what is meant by a basic of semiconductors. 4. Discuss the reaction and involvement of semiconductors in generate the currents. 5. Describe mobility of electrons and conductivity in metals. 6. Define Ohm's law. 7. Identify the pure semiconductors. 8. Identify the impure semiconductors 9. Discuss the impure semiconductors N and P types 10. Explain the type of electronic emission.

Indicative Contents	Indicative content includes the following. Part A - Energy Bands in Solids Describe the structure of an atom ◆ Discuss insulators, conductors, and semiconductors and how they differ. [9 hrs] Revision problem classes [3 hrs] Part B - Transport Phenomena in Semiconductor Describe how current is produced in a semiconductor ◆ Describe the properties of n-type and p-type semiconductors. [30 hrs]

Learning and Teaching Strategies

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills.

Student Workload (SWL)

Structured SWL (h/sem)	111	**Structured SWL (h/w)**	3

Unstructured SWL (h/sem)	65	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**176**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10	[2,4,5,6]	LO (#1- #12)
	Assignments	2	10	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	20% (20)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Energy Bands in Solids
Week 2	Fermi-Dirac distribution function
Week 3	Properties of intrinsic P and N type semiconductors
Week 4	Mobility and conductivity
Week 5	Electrical conduction in intrinsic semiconductor
Week 6	Hall Effect
Week 7	Generation and recombination of charges
Week 8	Diffusion current continuity equation
Week 9	Injection minority carrier charges
Week 10	N-type semiconductor
Week 11	Solved problems
Week 12	P-type semiconductor
Week 13	Solved problems
Week 14	Photo-conductivity
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1.“NTEGRATEDELECTRONICS"ByMILLMAN&HALKIES 2. “SEMICONDUCTOR DEVICES & CIRCUITS" ،JOHN WILEY & SONS	Yes
Recommended Texts	1. (Floyed) 2. ثيراجا فصل ٥١	Yes

Grading Scheme

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Semiconductor devices**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI219**				
ECTS Credits	6				
SWL (hr/sem)	111				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EI		**College**	NE	
Module Leader	Hamsa Fawaz Thanoon		**e-mail**	hamsa.thanoon@uoninevah.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date	04/07/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module		**Semester**	

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. To develop problem solving skills and understanding of Atomic Structure 2. To understand Energy band structure of metal, insulator, and semiconductor. 3. To understand Properties of intrinsic P and N type semiconductors. 4. To understand Electrical conduction in intrinsic semiconductor. 5. To understand Properties of extrinsic semiconductors. 6. To understand Electrical conduction in extrinsic semiconductor
Module Learning Outcomes	1. Recognize how semiconductors works in electronics circuits. 2. List the various terms associated with electronics circuits. 3. Summarize what is meant by a basic of semiconductors. 4. Discuss the reaction and involvement of semiconductors in generate the currents. 5. Describe mobility of electrons and conductivity in metals. 6. Define Ohm's law. 7. Identify the pure semiconductors. 8. Identify the impure semiconductors 9. Discuss the impure semiconductors N and P types 10. Explain the type of electronic emission.

Indicative Contents	Indicative content includes the following. Part A - Energy Bands in Solids Describe the structure of an atom ◆ Discuss insulators, conductors, and semiconductors and how they differ. [9 hrs] Revision problem classes [3 hrs] Part B - Transport Phenomena in Semiconductor Describe how current is produced in a semiconductor ◆ Describe the properties of n-type and p-type semiconductors. [30 hrs]

Learning and Teaching Strategies

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills.

Student Workload (SWL)

Structured SWL (h/sem)	111	**Structured SWL (h/w)**	3

Unstructured SWL (h/sem)	65	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**176**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10	[2,4,5,6]	LO (#1- #12)
	Assignments	2	10	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	20% (20)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	PN junction in equilibrium

Week 2	Volt Ampere characteristics; Temperature dependence
Week 3	diffusion capacitance
Week 4	Non-linear properties; Ideal diode; Basic theory and analysis of simple diode circuit; DC load line; Small signal analysis and concept of dynamic resistance; AC load line
Week 5	Diode capacitance ;Temperature effects of diode
Week 6	Different types of diodes (Zener; schottckey);
Week 7	(Varactor diode; Tunnel and negative resistance diodes).
Week 8	Circuit analysis of half wave and full wave rectifiers
Week 9	Bridge rectifier; Ripple and form factor calculations
Week 10	Types of filters; C filters , L filter ,L .C. filter, PIE filter; Analysis of filter and calculation of ripple and regulation.
Week 11	Solved problems
Week 12	Clipping and Clam Ping Circuit:
Week 13	Transistors: PNP; NPN
Week 14	The BJT as an Amplifier
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	1: " SOLID STATE DIVICES" ،PHI; 4TH EDITION ،1995.By STREETMAN ،	Yes

	2: “SEMICONDUCTOR DEVICES & CIRCUITS" ،JOHN WILEY & SONS ،1992.By : M.S. TYAGI 3: " ELECTRONICS DEVICES & CIRCUITS THEORY" ،HI; By BOYLSTED & NASHELSKY	
Recommended Texts	3. (Floyed) 4. ثيراجا فصل ٥١	Yes

Grading Scheme				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Principle of Mechanical Engineering**			**Module Delivery**	
Module Type	**Base**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEMB1302				
ECTS Credits	**7**				
SWL (hr/sem)	**45**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	2/07/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	Students will be able to: 15. Students will be able to: 16. Knowing the different methods of making calculations related to forces and their effects on two- and three-dimensional systems 17. Clarify that the subject represents a very important introduction to other subjects for the later stages of the student's study and building a scientific base for the student to ensure the possibility of understanding the relevant subjects in the later stages. 18. The student will learn different applications of commonly used Mechanical machinery. 19. The student will learn strong basics of Mechanical Engineering fundamentals.
Module Learning Outcomes	1. Have understood and overcome any misconceptions about basic concepts in physics (force, energy, work etc). 2. Restate existing problem solving skills in a form more suitable for engineering applications. 3. Interpret basic engineering applications of mechanics in more detail. 4. Acquire four basic thinking skills: 1. Perceive, or resolve, contradictions involving their preconceptions about mechanics. 2. Organize the basic ideas of mechanics in a form suitable for problem solving. 3. Apply basic principles in mechanics to realistic engineering situations. 4. Solve realistic engineering problems.
Indicative Contents	**Indicative content includes the following:-** **Statics – Introduction [25 hrs]** ○ Vectors ○ Newton's Laws ○ Fundamental Units

	○ Types of force ○ Parallelogram law ○ Resultant forces ○ Moments and couples ○ Moment of couples ○ Eequilibriums ○ Free body diagram ○ Coplanar system ○ Friction: Nature of friction; Theory of friction; Coefficient of friction **Dynamics – Introduction [20 hrs]** ○ Basic concepts ○ Newton's Laws ○ Formulation and solution of problems ○ Kinematics of Particles ○ Rectilinear motion ○ Curvilinear motion ○ Relative motion ○ Kinetics of Particles ○ Newton's second Law ○ Work and energy -

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)	25	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	20	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	45		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	6	5% (5)	٢, ٥, ٩,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	5% (5)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	0	0%		
	Report	0	0%	0	
Summative assessment	Midterm Exam	3hr	30% (30)	10	LO # 1-7
	Final Exam	3hr	60% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Force system; Units system;
Week 2	Parallelogram law; Forces + components
Week 3	Resultant of coplanar forces
Week 4	Components of force in space
Week 5	Moment of a force
Week 6	Moment of a force
Week 7	Moment of a force
Week 8	Free body diagram; Coplanar system
Week 9	Friction: Nature of friction; Theory of friction
Week 10	Coefficient of friction
Week 11	Coefficient of friction
Week 12	Coefficient of friction

Week 13	Normal and tangential components of acceleration
Week 14	Normal and tangential components of acceleration
Week 15	
Week 16	Normal and tangential components of acceleration

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1. Engineering Mechanics (statics) By: J.L. MERIAM 2. Engineering Mechanics (Dynamics) By: J.L. MERIAM	Yes
Recommended Texts	➢	No
Websites		

Grading Scheme

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**AC Machines**			**Module Delivery**	
Module Type	**Support or related learning activity**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒**Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI323**				
ECTS Credits	**6**				
SWL (hr/sem)	**175**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	Electronic Dept.		**College**	Electronics Collage	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules			
Prerequisite module	DC Machine	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	20. Understanding AC Machine Principles 21. Analyzing AC Machine Behavior 22. Control Strategies 23. System Integration 24. Practical Applications 25. Problem-Solving Skills 26. Laboratory Skills 27. Teamwork and Communication 28. Professional Development
Module Learning Outcomes	5. Understand how voltage is induced in a rotating loop 6. Understand how curved pole faces contribute to a constant flux, and thus 7. more constant output voltages. 8. Understand how curved pole faces contribute to a constant flux, and thus more constant output voltages. 9. Understand the power flow diagram for Ac machines 10. Know the types of Ac machines in general use. 11. Understand the equivalent circuit of a three phase induction motor. 12. Understand how to derive the Torque speed characteristic of three phase induction motor. 13. Understand how to control the speed of different types of AC motors. 14. Understand the starting torque, condition for maximum torque, condition for maximum starting torque of the Ac motors. 15. Understand the methods of starting AC motors safely. 16. Understand the equivalent circuit of a AC generator. 17. Understand of Single phase Induction motor . Construction , theories of operation, torque speed characteristic, Equivalent circuit. 18. Understand how Test of single phase induction motor, no load test, blocked rotor test, power flow diagram, applications. 19. Understand how Three phase synchronous generator, Construction, Equivalent circuit, applications.

	20. Understand how Single phase synchronous motors, Reluctance motor, Construction of reluctances motor, applications. 21. Understand how Hysteresis motor, Construction of Hysteresis motor, application. 22. Be able to explain how copper losses, leakage flux, hysteresis, and eddy currents are modeled in Ac machines circuits.
Indicative Contents	Introduction - The module further develops students' understanding of electrical machines by introducing the operational principles and characteristics of AC machines, three phase circuits and complex power. It introduces the principles, operation and design of common power electronic converter circuits.(12 hrs.)
	Commutation and Armature Construction in Real Tree phase induction motor.(8 hrs.)
	Introduction of The Equivalent Circuit of a Tree phase induction motor. (10 hrs.).
	Power Flow and Losses in Tree phase induction motor. (6 hrs.)
	Torque speed characteristic, starting torque, condition for maximum torque, condition for maximum starting torque.(12 hrs.)
	Test of three phase induction motor, no load test, blocked rotor test, power flow diagram, applications.(12 hrs.)
	Mid-term Exam. .(3 hrs.).
	Single phase Induction motor.(4 hrs.).
	Introduction of Single phase Induction motor . Construction , theories of operation, torque speed characteristic, Equivalent circuit, (12 hrs.).
	Test of single phase induction motor, no load test, blocked rotor test, power flow diagram, applications.(12 hrs.).
	Three phase synchronous generator, Construction, Equivalent circuit, applications. (12 hrs.).
	Single phase synchronous motors, Reluctance motor, Construction of eluctance motor, applications.(10 hrs.).
	Hysteresis motor, Construction of Hysteresis motor , application .(9 hrs.).
	AC Commutator machine,Universal motor.(12 hrs.).

Learning and Teaching Strategies	
Strategies	Visual Aids Problem-Solving Exercises Real-World Applications Group Projects Simulations and Virtual Labs Multimedia Resources Real-Life Examples

Student Workload (SWL)			
Structured SWL (h/sem)	74	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	101	**Unstructured SWL (h/w)**	4.64
Total SWL (h/sem)	175		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	
	Final Exam	2hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction - The module further develops students' understanding of electrical machines by introducing the operational principles and characteristics of AC machines, three phase circuits and complex power.
Week 2	Commutation and Armature Construction in AC Machine.
Week 3	Introduction of The Equivalent Circuit of a Tree phase induction motor.
Week 4	Power Flow and Losses in Tree phase induction motor.
Week 5	Torque speed characteristic, starting torque, condition for maximum torque, condition for maximum starting torque in Tree phase induction motor.
Week 6	Test of three phase induction motor, no load test, blocked rotor test. **, applications**
Week 7	Mid-term Exam.
Week 8	Introduction of Single phase Induction motor. Construction, theories of operation.
Week 9	Torque speed characteristic, Equivalent circuit, of single phase induction motor.
Week 10	power flow diagram of single phase induction motor & applications.
Week 11	Test of single phase induction motor, no load test, blocked rotor test of Single phase Induction motor.
Week 12	Three phase synchronous generator, Construction, Equivalent circuit, applications.
Week 13	Single phase synchronous motors, Reluctance motor, Construction of reluctances motor, applications.
Week 14	Hysteresis motor, Construction of Hysteresis motor , application
Week 15	AC Commutator machine, Universal motor
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Electrical Machinery Fundamentals" edited by Stephen J. Chapman.	NO
Recommended	electrical machines and transformer by: Ancieron and	NO

Texts	Macneiil	
Websites	https://www.coursera.org	

Grading Scheme				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Informationa				
Module Title	**DC Machines**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒**Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NEEI2313**			
ECTS Credits	**6**			
SWL (hr/sem)	**114**			
Module Level	2	**Semester of Delivery**	1	
Administering Department	Electronic Dept.	**College**	Electronics collage	
Module Leader		**e-mail**		

Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules			
Prerequisite module	DC Circuit Analysis	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	29. Understanding DC Machine Principles 30. Analyzing DC Machine Behavior 31. Control Strategies 32. System Integration 33. Practical Applications 34. Problem-Solving Skills 35. Laboratory Skills 36. Teamwork and Communication 37. Professional Development
Module Learning	23. Understand how voltage is induced in a rotating loop

Outcomes	24. Understand how curved pole faces contribute to a constant flux, and thus 25. more constant output voltages. 26. Understand how curved pole faces contribute to a constant flux, and thus more constant output voltages. 27. Understand the power flow diagram for de machines 28. Know the types of de motors in general use. 29. Understand the equivalent circuit of a de motor. 30. Understand how to derive the torque-speed characteristics of separately excited, shunt, series, and compounded de motors. 31. Understand how to control the speed of different types of de motors. 32. Understand the special characteristics of series de motors, and the applications. 33. Understand the methods of starting dc motors safely. 34. Understand the equivalent circuit of a dc generator. 35. Understand the purpose of a transformer in a power system. 36. Understand how real transformers approximate the operation of an ideal transformer. 37. Be able to explain how copper losses, leakage flux, hysteresis, and eddy currents are modeled in transformer equivalent circuits.
Indicative Contents	Introduction - A Simple Rotating Loop between Curved Pole Faces. The Voltage Induced in a Rotating Loop / Getting DC Voltage Out of the Rotating Loop / The Induced Torque in the rotating loop.(12 hrs.).
	Commutation and Armature Construction in Real DC Machine. .(8 hrs.).
	Power Flow and Losses in DC Machines. .(6 hrs.).
	Introduction to DC Motors. The Equivalent Circuit of a DC Motor. The Magnetization Curve of a DC Machine. Separately Excited and Shunt DC Motors.(10 hrs.).
	Permanent-Magnet DC Motor. The Series DC Motor. The Compounded DC Motor. .(6 hrs.).
	Motor Starters. Solid-State Speed Controllers. .(12 hrs.).
	DC Motor Efficiency Calculations. .(4 hrs.).
	Mid-term Exam. .(3 hrs.).
	Introduction to DC Generators. The Separately Excited Generator. .(12 hrs.).
	The Shunt DC Generator. The Series DC Generator.(4 hrs.).
	The Cumulatively Compounded DC Generator. The Differentially Compounded DC Generator. .(4 hrs.).

	Types and Construction of Transformers. The Ideal Transformer. .(10 hrs.).
	Theory of Operation of Real Single-Phase Transformers. The Equivalent Circuit of a Transformer. .(18 hrs.).
	Transformer Voltage Regulation and Efficiency. .(12 hrs.).
	Instrument Transformers. .(4 hrs.).

Learning and Teaching Strategies	
Strategies	Visual Aids Problem-Solving Exercises Real-World Applications Group Projects Simulations and Virtual Labs Multimedia Resources Real-Life Examples

Student Workload (SWL)			
Structured SWL (h/sem)	74	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	40	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	114		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	
	Final Exam	2hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction - A Simple Rotating Loop between Curved Pole Faces. The Voltage Induced in a Rotating Loop / Getting DC Voltage Out of the Rotating Loop / The Induced Torque in the rotating loop.
Week 2	Commutation and Armature Construction in Real DC Machine.
Week 3	Power Flow and Losses in DC Machines.
Week 4	Introduction to DC Motors. The Equivalent Circuit of a DC Motor. The Magnetization Curve of a DC Machine. Separately Excited and Shunt DC Motors
Week 5	Permanent-Magnet DC Motor. The Series DC Motor. The Compounded DC Motor.
Week 6	Motor Starters. Solid-State Speed Controllers.
Week 7	DC Motor Efficiency Calculations.
Week 8	Mid-term Exam.
Week 9	Introduction to DC Generators. The Separately Excited Generator.
Week 10	The Shunt DC Generator. The Series DC Generator
Week 11	The Cumulatively Compounded DC Generator. The Differentially Compounded DC Generator.
Week 12	Types and Construction of Transformers. The Ideal Transformer.
Week 13	Theory of Operation of Real Single-Phase Transformers. The Equivalent Circuit of a Transformer.
Week 14	Transformer Voltage Regulation and Efficiency.
Week 15	Instrument Transformers.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Electrical Machinery Fundamentals" edited by Stephen J. Chapman.	NO
Recommended Texts	electrical machines and transformer by: Ancieron and Macneiil	NO
Websites	https://www.coursera.org	

Grading Scheme				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Digital Design			**Module Delivery**	
Module Type	**Base**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEMB2306**				
ECTS Credits					
SWL (hr/sem)	60				
Module Level	2		**Semester of Delivery**	1	
Administering Department	Electronic Eng. Dep.		**College**	Electronics Engineering	
Module Leader	Amer Talal Ali		**e-mail**		
Module Leader's Acad. Title	Lecturer assistant		**Module Leader's Qualification**		
Module Tutor	Amer Talal Ali		**e-mail**		
Peer Reviewer Name	Name		**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	15. To understand Advanced Minimization techniques for large number of bits to simplify the large designs. 16. Understand how to Design an Arithmetic and Logic unit. 17. Understand how to Design using programmable logic device. 18. To understand the sequential Logic Circuits. 19. To understand how to Design synchronous and asynchronous counters. 20. To understand the Design of Registers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Using Advanced Minimization techniques for large number of bits to simplify the large designs. 2. Design an Arithmetic and Logic unit. 3. Design using programmable logic device. 4. Design sequential Logic Circuits synchronous and asynchronous. 5. Design Registers. 6. Design synchronous and asynchronous counters.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – minimization techniques for large number of bits [14 hrs] Part B – Initialization to design and Design an Arithmetic and Logic unit. [14 hrs]

	Part C – Design using programmable logic device. [6 hrs] Part D – sequential Logic Circuits. [18 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking and digital designing skills. This will be achieved through classes and interactive tutorials.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**120**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	Midterm Exam	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Digital Design
Week 2	The 5-Variable Karnaugh Map; The 5-Variable Karnaugh Map with don’t care conditions

Week 3	Map Entered variable Karnaugh Map
Week 4	ADDITIONAL MINIMAZATION TECNHNIQUES: Tabular method; Quine-McCluskey
Week 5	Design using multiplexer: - Shannon Expansion
Week 6	top-down desigin of combainaonal CIRCUITS: - Gate Level: Adders; Subtractor
Week 7	Design an Arithmetic and Logic unit
Week 8	memory and type of memories
Week 9	Design using programmable logic device (PLD): - PROM; PAL; PLA;
Week 10	sequential LOGIC: - Type of flip-flops; Timing Diagram; Basic concepts of counters; Binary counters; BCD counters; Up down counter
Week 11	sequential LOGIC: -Design of counters using state diagrams and tables;
Week 12	sequential LOGIC: -Mealy and Moore Circuits;
Week 13	synchrous CIRCUITS: Shift left and right register; Registers with parallel load; Serial –in arallel-out (SIPO) and parallel-in-serial-out (PISO).
Week 14	synchrous CIRCUITS: Shift Registers; Twisted Ring Counter; Maximum Length Shift Counter.
Week 15	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Digital and analog communication" 2001 By L. W. Couch Sixth Edition	Yes
Recommended	- Digital Communications Fifth Edition, 2008, John G. Proakis,	Yes

Texts	and Masoud Salehi. Introduction to Communication Systems" 1992 By F. Stremler. -ELEMENTS OF INFORMATION THEORY" 2006 By THOMAS M. COVER and JOY A. THOMAS -Digital Communication, 2004 by Abbas Kattoush.	
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information

Module Title	**Electronic I**	**Module Delivery**	
Module Type	**core**		☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**
Module Code	**NVEEELI212**		
ECTS Credits	**7**		
SWL (hr/sem)	**164**		

Module Level	1	**Semester of Delivery**	1
Administering Department	Electronics	**College**	Electronic Engineering college
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Prof.	**Module Leader's Qualification**	PhD
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	Ahmad.younis@uoninevah,edu,iq
Scientific Committee Approval Date	12/06/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module	NEEI1223	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	38. To understand the basic theory and operation of bipolar transistor 39. To be familiar with current mechanism in an npn and pnp transistors 40. To concentrate transistor physical and electrical characteristics 41. To illustrate and design different dc biasing circuits 42. To understand the biasing stability conditions 43. To be able to deal with the mathematical behavior of transistor model 44. To understand small signal analysis of transistor amplifier 45. To deal with different transistor amplifier configuration 46. To be able to deal with the frequency response of transistor amplifier 47. To understand the basic operation of field effect transistor and MOS device 48. To understand the dc and ac behavior of FET and MOS amplifiers
Module Learning Outcomes	38. Understand and apply the basic theory and operation of transistor amplifiers 39. Define and explain the electrical characteristic of bipolar transistor 40. Understand the basic structure of npn and pnp transistors 41. Understand and analyze the electrical transistor model 42. Understanding the dc and ac analysis of transistor amplifier 43. Dealing with dc biasing and ac amplifiers 44. Understanding the effect of frequency on amplifier response 45. Familiar with other FET and MOS circuits

Indicative Contents	**Bipolar junction transistors,** Transistor construction, transistor operation, NPN & PNP Bipolar Transistor; Current Flow Mechanism in Transistor Junctions; Transistor configurations; Current Gain Calculation [Alpha] and [Beta]; Transistor input/ output characteri DC Load line ; Operating point; Different DC circuit biasing. Bias circuit, voltage divider circu bias with feedback **DC biasing,** Operating point, fixed bias circuit, emitter bias circuit, voltage divider circuit, dc bias with feed **Biasing stability** Stability factor analysis due to temperature variation (Effect of Ico, Vbe and Beta); Temperat compensation using diode biasing. **Small signal analysis,** Small signal equivalent circuit for CB, CE and CC configuration; Input/Output resistance; Calculation of current and voltage Gain in small signal amplifier; Graphical Analysis for voltage gain; Hybric parameters to analyze transistor circuits. **Field Effect Transistor (FET) and MOS transistor :** **FET biasing configurations, Depletion and Enhanced mode operation,** Introduction to the theory and operations of JFFT & MOSFET; FET Transistor configuratio Transistors transfer characteristics; Amplifier Circuit Biasing; transistor Equivalent circuit; S signal analysis of FET transistor. **FREQUENCY RESPONSE:** Definition and Concepts; Gain in decibel; Bode plot for the gain; The effect of the Coupling capacitor; Low frequency analysis due to the R-C Coupled amplifier in BJTs; the Effect of emit bypass capacitor**;** Calculation of the Low cut-off frequency. Transistor amplifier at high frequer Hybrid PIE equivalent circuit at high frequency; High frequency behavior of CB & CE amplifi High cut-off frequency; Gain Band-Width products for the above circuits; FET at high frequenc CD and CS amplifier at high frequency; .

Learning and Teaching Strategies

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)	88	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	76	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	164		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	٢, ٥, ٩,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1:30hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Transistor construction and operation
Week 2	Bipolar transistor current flow mechanism

Week 3	Transistor configurations, current gain calculation, and input and output resistances
Week 4	Dc biasing circuits, operating point calculation
Week 5	Biasing stability, stability factor calculation
Week 6	Temperature compensation using diode biasing
Week 7	Small signal equivalent circuit for CB, CC, CE configurations
Week 8	Calculation of voltage and current gains
Week 9	Hybrid model ac analysis of transistor amplifier
Week 10	FET and MOS transistors operation
Week 11	FET biasing configurations
Week 12	Depletion and enhancement mode operation
Week 13	Definition and analysis of amplifier frequency response
Week 14	Low frequency and high frequency analysis
Week 15	Hybrid-Pie equivalent circuit at high frequency
Week 16	**Subject review**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1-15	**Practical experiments in transistor amplifiers to measure the current and voltage gains.** **To measure the input and output amplifier resistances** **To measure the amplifier frequency response.**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	**Textbook1:INTEGRATEDELECTRONICS"MCGRAWHILL;9T HREPRINT,1995**.ByMILLMAN&HALKIES **2: " ELECTRONICS DEVICES AND COMPONENTS", PITMAN,** 1995 By MOTTERSHED,. ,	yes
Recommended Texts	**3: " SOLID STATE DIVICES", PHI; 4TH EDITION**, 1995.By STREETMAN, **4" SEMICONDUCTOR DEVICES & CIRCUITS", JOHN WILEY & SONS, 1992**.By : M.S. TYAGI	Yes
Websites	Electronic circuits	

Grading Scheme				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Electronic circuits**			**Module Delivery**	
Module Type	**core**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**NEEI2322**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Electronics		**College**	Electronic Engineering college	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Assistant Prof.		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**		
Peer Reviewer Name	Name		**e-mail**	Ahmad.younis@uoninevah,edu,iq	
Scientific Committee Approval Date	12/06/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	NEEI2212	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	49. To understand the basic analysis of bipolar transistor amplifier 50. To be familiar with the dc and ac analysis of transistor amplifier 51. To understand the dc and ac analysis of FET amplifier 52. To illustrate and to understand the frequency response of amplifier 53. To understand the basic concept of feedback concept 54. To be able to deal with different feedback amplifier topologies 55. To study the advantages of negative feedback on amplifier performance 56. To be familiar with feedback amplifier ac analysis 57. To understand the construction and ideal characteristic of operational amplifier 58. To study and analyze op-amp equivalent circuit 59. To be familiar with basic op-amp applications 60. To start with studying power electronic devices
Module Learning Outcomes	46. Understand and apply the basic theory and operation of transistor amplifiers 47. Define and explain the frequency response of bipolar transistor amplifier 48. Understand the basic concept of negative feedback 49. Understand and analyze the feedback amplifier 50. Understanding the operation of ideal operational amplifier 51. Dealing with dc and ac op-amp equivalent circuit 52. Understanding the basic application of op-amp 53. Power electronic devices principle overview

Indicative Contents	**Transistor and FET amplifier analysis:** Small signal model analysis, low frequency and high frequency analysis, hybrid model, hybrid -Pi model analysis. **Amplifier with negative feedback:** Basic concept, feedback analysis, feedback configurations, Feedback effects on gain , bandwidth, input and output resistances **Operational amplifier:** Ideal Op-amp equivalent circuit; Operational Amplifier Specification; Circuit analysis of an Op-amp; Closed loop Op-amp Circuit (Inverting and Non-Inverting Circuit). **Op-amp Applications:** Summation & subtraction Circuit, Differential circuit Buffer circu Ideal and practical Integrator circuits, ideal and practical Differentiator circuits, Examples. **Power electronic devices:** UJT Construction, Operation and characterises; Thyrsistor Equivalent Circuit ; Thyrsistor Characteristics and operation ; Application of the devices.

Learning and Teaching Strategies

Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)	74	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	101	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	175		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	٢, ٥, ٩,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1:30hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered

Week 1	Small signal model analysis
Week 2	Low and high frequency response of transistor amplifier
Week 3	Hybrid and hybrid-Pie equivalent circuit analysis
Week 4	Negative feedback concept and analysis
Week 5	Advantages of negative feedback on amplifier
Week 6	Amplifier feedback topologies
Week 7	Feedback effect on amplifier gain, bandwidth, and on input-output resistances
Week 8	operational amplifier construction and operation
Week 9	ideal and practical op-amp equivalent circuit
Week 10	Inverting and non inverting closed loop amplifier
Week 11	Integration and differentiation active circuits
Week 12	Summation and subtraction op-amp circuits
Week 13	UJT transistor construction
Week 14	Thyristor equivalent circuit and characteristics
Week 15	Subject review
Week 16	**Subject review**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1-15	**Practical experiments in transistor amplifier frequency response at lo and high frequency** **To measure the effect of feedback on amplifier performance** **To measure the performance of different op-amp circuits.**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Electronic Devices By Millmann Electronic Devices By Floyd	yes
Recommended Texts	**SOLID STATE DIVICES", PHI; 4TH EDITION**, 1995.By STREETMAN, **SEMICONDUCTOR DEVICES & CIRCUITS", JOHN**	Yes

	WILEY & SONS, 1992.By : M.S. TYAGI	
Websites	Electronic circuits	

Grading Scheme				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Fundementals of Electromagnatics**			**Module Delivery**	
Module Type	**Base**			☐ **Theory**	
Module Code	NVEEELI221			☒ **Lecture**	
ECTS Credits	4			☐ **Lab**	
SWL (hr/sem)	45			☒ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	2	**Semester of Delivery**	1		
Administering Department	Type Dept. Code	**College**	Type College Code		
Module Leader	SINAN KHALID SHANSHAL	**e-mail**	**sinan.mohammed@uoninevah.edu.iq**		
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.		
Module Tutor		**e-mail**			
Peer Reviewer Name	Name	**e-mail**	E-mail		
Scientific Committee Approval Date	02/07/2023	**Version Number**	1.0		

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	To develop knowledge of the laws governing the behavior of electric and electro-magnetic fields, and to relate the laws governing the fields to applications in a range of electrical and electronic engineering application.
Module Learning Outcomes	On completion of the course the students should be able: • to have detailed knowledge of the physical background and terminology of the electromagnetic field theory for electrical engineering problems • to understand the electromagnetic field behavior • to select and use appropriate theoretical models for analysis, problem solving and finding solutions related to the electrostatic, magnetostatic and electromagnetic fields • to understand how laws of electromagnetism can be applied to problems arising in engineering and biomedical sciences.
Indicative Contents	Electric charge and the electric field Electric flux density and Gauss's Law Electric scalar potential Electric field in matter and boundary conditions Capacitance Magnetic field and Ampere's Law Magnetic flux and Gauss's Law for magnetic fields Faraday's Law Inductance Maxwell's equations Applications of Electromagnetics

Learning and Teaching Strategies	
Strategies	Through the presentation of a theoretical explanation with the aid of white board and 'Data Show', to illustrate syllabus (examples and exercises) and using text books.

Student Workload (SWL)

Structured SWL (h/sem)	45	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	؟	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	؟		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	15% (10)	5,8,10,12	LO #1-5, 9 and 11
	Assignments	4	15% (10)	6,9,11,13	LO # 1-5, 6, 10 and 12
	Projects	0	0% (0)		
	Report	0	0% (0)		
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	10	LO # 1-8
	Final Exam	3hr	50% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Review of Vector Calculus
Week 2	Review of Vector Calculus
Week 3	Experimental law of coulomb; Electric field intensity;
Week 4	Field of a continuous and volume charge distributions; line charge and sheet charge;
Week 5	Electric flux law density; Gauss's law; Application of Gauss's law; Some symmetrical charge distributions.
Week 6	Energy expended in moving a point charge in an electric field
Week 7	Definition of potential difference and potential
Week 8	Potential field of a point charge and system of charges; Potential gradient;
Week 9	Boit – Savart law
Week 10	Amperes law
Week 11	Magnetic Flux and Magnetic Flux Density
Week 12	Force on Differential Current Elements; Force and Torque on a Closed Circuit;

Week 13	Faraday's Law; Maxwell's Equations
Week 14	Example of Maxwell's Equations
Week 15	Wave Equations.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1-15	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1-ENGINEERING ELECTROMAGNETICES, Mc- Graw Hill, By WILLAIM H. HAYT. 2-Elements of engineering electromagnetic, Prentice Hall, By Matthew N. O. SADIKU	No
Recommended Texts	1-Electromagnetics (Schaum's Outlines), McGraw-Hill Education, By Edminister, Joseph_ Nahvi, Mahmood.	No
Websites		

Grading Scheme				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Programming			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	NVEEELI214			☒ **Lecture**	
ECTS Credits	**5**			☒ **Lab**	
SWL (hr/sem)	**150**			☐ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	2		**Semester of Delivery**	2	
Administering Department	Dept. of Electronic Eng. (Med. Ele)		**College**	College of Electronic Engineering	
Module Leader	Qais Thanon		**e-mail**	Qais.najim@uoninevah.edu.iq	
Module Leader's Acad. Title	Porf.		**Module Leader's Qualification**	Ph. D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	20/06/2023		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Learning about the algorithms types and how building the algorithms. 2. Learning how to command computers to perform tasks using C++ language (Programming/coding). 3. Become acquainted with the designed programming including sequencing, condition and iteration. 4. Learn about the 1d and 2d arrays in C++ language. 5. Learn about the functions in C++ language. 6. Learn about the strings in C++ language.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding the meaning of the algorithms in programming languages. 2. Understanding the basics concepts of C language programming such as variables, data types, operators, control 3. Understanding the utilities of each one of sequencing, condition, and loops, and basic input/output operations. 4. Understanding how represent the data in 1d arrays and 2d arrays. 5. Learn about how the strings represented in C language. 6. Learn about divide any problem in sub-program and execute this problem by using function. 7. In advance practical experience by working on programming exercises and projects.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Visualization via flowchart and Pseudocode [4 hrs] • Keyworks, identifier, format specifier, and naming variables and constants [8 hrs] • Use standard libraries to take input and display output [8 hrs] • Operators in C++ programming [10 hrs] • Priorities in C++ programming [4 hrs] • Math functions [4 hrs] • Conditional operations [8 hrs] • Iterations (Loop operators) [10 hrs] • Arrays [10 hrs] • Functions [8 hours] • Review classes and problem solving [8 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy being focused on is developing conceptual programming thinking, meanwhile refining and expanding their mathematical thinking skills. This will be achieved through classes, online lectures, interactive tutorials. Additionally, working on complex projects that challenge students' skills and require to apply advanced concepts. Such projects would help students exploring various aspects of C++ programming and gain hands-on experience in solving complex problems. some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	77	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	73	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem)	**150**		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to computer languages and the structure of C program
Week 2	Flowchart and Pseudo-code
Week 3	Introduction to C++ programming: Declare variables and constants
Week 4	Take input and print output
Week 5	Assignment and Increment ,Decrement, Arithmetic, Logical, and Bitwise operators

Week 6	Standard math functions in math header <math.h>
Week 7	Priorities of operators in C++ programming
Week 8	Relational and conditional operators
Week 9	Mid-term Exam
Week 10	If statement versus switch case statement
Week 11	Examples of structured programming (sequencing and condition)
Week 12	Loop operators (For, while, do-while)
Week 13	Arrays
Week 14	Functions
Week 15	String of characters
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-2	Learn the C++ language program complier.
Week 3-4	Declare variables and constants and <iostream.h> including standard functions
Week 5-6	Arithmetic, logical, and bitwise operators
Week 7-8	Math header for math functions <math.h> and Assignment and increment & decrement operators
Week 9-10	Relational and conditional operators and Loop operators
Week 11-12	Examples about the Arrays

Week 13-14	Examples about Functions and string

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	C Programming Absolute Beginner's Guide, 3rd Edition 2014. BY: Greg Perry and Dean Miller.	Yes
Recommended Texts	C How to Program with an introduction to C++, 8th Edition 2016. *BY: Paul Deitel and Harvey Deitel.* Global Edition contribution by Piyali Sengupta	No
Websites	1- https://www.programiz.com/c-programming 2- https://www.coursera.org/specializations/c-programming	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NV12				
ECTS Credits	**2**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	SCE		**College**	EE	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Noor Mothafar Hamid		**Module Leader's Qualification**	MS.D.	
Module Tutor	Name (if available)		**e-mail**	noorm.hame@duoninevah.edu.iq	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	61. To develop skills, reading, writing and understanding of English language through the application of teaching techniques. 62. To understand scientific subjects and technical terms through reading and comprehension. 63. This course deals with the basic concepts of scientific subjects. 64. This course handles how to write simple research and how to make a successful presentation. 65. To understand the scientific language in English.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	54. Recognize parts of speech and tenses in English language. 55. List the various terms associated with scientific texts. 56. Summarize what is meant by a basic electric circuit. 57. Discuss Electric currents, series and parallel circuits. 58. Describe electrical power, charge, and current. 59. Discuss computers, communication and the future of computers.. 60. Identify the basic circuit elements and their applications. 61. Explain energy types and forms. 62. Discuss the various properties of radio waves and vacuum tubes. 63. Explain modulation. 64. Discuss Electromagnetism.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1.parts of speech _verb _ noun

	_ pronoun 2.Tenses _Past _Present _future 3.Electric currents and circuit _AC/DC _parallel, serious _Grounding, fuse, short circuit 4.Radio waves and vacuum tubes 5. Electromagnetism. 6. The future of computers, communication applications. _fiber optics. 7. Induction. _Electric generator _Electric transformer _self-induction _servomechanism 8. Incandescent lamp. 9. Energy. _types of energy _forms of energy 10. Introduction to electron and electricity. 11.Electricity and electronics.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation by reading, writing and comprehension in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, presentation, interactive tutorials, by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	70	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10% (10)	4,6	LO #1, 2, 3,4 ,5and 6
	Assignments	2	10% (10)	9, 12	LO # 7,8,9,10,11and 12
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 13,14
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO #
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Parts of speech
Week 2	Tenses
Week 3	Electric currents and circuit

Week 4	Radio waves and vacuum tubes
Week 5	The future of computers, communication applications.
Week 6	Induction -Electric generator -Electric transformer
Week 7	Mid-term Exam
Week 8	Induction -Self-induction -Servomechanism
Week 9	Incandescent lamp.
Week 10	Energy. -types of energy -forms of energy
Week 11	Introduction to electron and electricity.
Week 12	Electricity and electronics
Week 13	The cathode ray tube
Week 14	Propagation
Week 15	Modulation
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	

Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	English in electrical engineering and electronics. The language of electrical and electronic engineering in English.	Yes
Recommended Texts	English for electrical engineering and computing.	No
Websites	https://www.askoxford.com/betterwriting/succesfulcv/application/?view=uk	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information

Module Title	**Signals and Systems**	**Module Delivery**	
Module Type	**Core**	**Theory** **☒ Lecture** **Lab** **☐ Tutorial** **☐X Practical** **☐ Seminar**	
Module Code	NVEEELI210		
ECTS Credits	4		
SWL (hr/sem)	150		
Module Level	1	**Semester of Delivery**	4
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	25/06/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module	None	**Semester**	

Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	Student will be able to: 21. identify systems concepts . 22. understand the properties of systems . 23. understand the mathematical relation between input and output of a system. 24. deal with Fourier and Laplace analysis of systems. 25. perform z-transform of discrete signals .
Module Learning Outcomes	48. Definition of the system concept. 49. Introduction of mathematical models. 50. Explain Continuous time systems. Discrete time systems. 51. Introduction of frequency response of systems. 52. Definition of filters. 53. Explain Ideal filters, Non ideal filters, and Butterworth filter design. 54. Define Z-transform of discrete signals. 55. Analyze of continuous system using Laplace Transform. System transfer function. 56. Definition of transfer function of a discrete system.
Indicative Contents	Indicative content includes the following. Introduction to systems: - Definition and mathematical models. - Properties of systems. Transformation used with continuous systems - Fourier transforms. - Filters.

	- Laplace transform. Z-transform: - Introduction of z- transform of discrete time signal. - Z-transform used with discrete systems. Convolution used for - Continuous systems. - Discrete systems

Learning and Teaching Strategies

Strategies	To make students interesting with both types of systems: continuous and discrete. Also with properties of systems and operations . To make them familiar with time and frequency domain and analysis of a system. Also to make them familiar with different types of transforms of systems. Also to make them have an experience with solving different problems and examples.

Student Workload (SWL)

Structured SWL (h/sem)ل	62	**Structured SWL (h/w)** ا	4
Unstructured SWL (h/sem)	88	**Unstructured SWL (h/w)**	1

Total SWL (h/sem)	**150**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	٢, ٥, ٩,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Basic definitions. Mathematical models.
Week 2	Continuous time systems.
Week 3	Discrete time systems.
Week 4	System properties.
Weeks 5	Mathematical system representation in time domain: Convolution representation.
Week 6	Convolution properties.
Week 7	System description by linear constant coefficient differential equations.
Week 8	Frequency domain analysis of continuous system.
Week 9	Frequency response of a system.
Week 10	Frequency response of electrical circuits.
Week 11	Ffilters. Distortion less transmission.
Week 12	Ideal filters. Non ideal filters. Butterworth filter design.
Week 13	Analysis of continuous system using Laplace Transform.
Week 14	System transfer function.
Week 15	Analysis of discrete system using z-Transform. System transfer function.

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	**Signals and Systems. Simon S. Haykin**	Yes
Recommended Texts	**Signals and linear Systems. G. E. Carlson**	

Grading Scheme

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors

	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**ANALOG CONTROL**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEEELI213				
ECTS Credits	٦				
SWL (hr/sem)	**122**				
Module Level	UGIII		**Semester of Delivery**	Five	
Administering Department	NEE		**College**	EEC	
Module Leader	Shawkat mohammed younus		**e-mail**	shawkat.younus@uoninevah.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**	E	
Peer Reviewer Name			**e-mail**	@uoninevah.edu.iq	
Scientific Committee Approval Date	/ /2023		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	NEEI2211	**Semester**	3
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this course: 1) Develop a strong mathematical background: a) Understand and apply fundamental mathematical concepts relevant to control systems. b) Acquire proficiency in algebra, calculus, and linear algebra necessary for control system analysis. 2) Explore control system configurations: a) Examine various control system architectures and their applications. b) Understand the principles and characteristics of open loop and closed-loop control systems. 3) Master block diagram reduction techniques: a) Learn systematic methods to simplify complex block diagrams. b) Apply reduction techniques to analyze and design control systems efficiently. 4) Understand signal flow graphs: a) Gain proficiency in representing control systems using signal flow graphs. b) Analyze and interpret the behavior of control systems through signal flow graph analysis. 5) Analyze the time response of control systems: a) Study the time-domain behavior of control systems. b) Analyze and interpret transient and steady-state responses of control systems. 6) Investigate stability of control systems: a) Understand the concept of stability in control systems. b) Analyze stability using various techniques such as Routh-Hurwitz criterion. 7) Perform root locus analysis: a) Learn the fundamentals of root locus analysis. b) Apply root locus techniques to analyze the behavior and stability of control systems. 8) Integrate theoretical concepts with practical applications:

	a) Apply the acquired knowledge to practical control system problems. b) Use simulation tools and software to implement and analyze control system designs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the module on Control Systems Fundamentals and Analysis, students will be able to: 1- Demonstrate a solid understanding of mathematical concepts relevant to control systems, including Laplace transform, algebra, calculus, and linear algebra, and apply them effectively in control system analysis. 2- Identify and explain various control system configurations, such as open-loop and closed-loop systems, and evaluate their advantages and limitations in different applications. 3- Apply block diagram reduction techniques to simplify complex control system diagrams and analyze the overall system behavior. 4- Construct and analyze signal flow graphs to represent and evaluate the behavior of control systems. 5- Analyze the time response of control systems, including transient and steady-state responses, and interpret the results in terms of system stability and performance. 6- Assess the stability of control systems using different methods, such as the Routh-Hurwitz criterion, and determine the stability margins of the system. 7- Perform root locus analysis to analyze and design control systems, and understand the impact of system parameters on stability and performance. 8- Apply theoretical concepts and analytical techniques to practical control system problems. 9- Utilize simulation tools and software to implement and analyze control system designs, and interpret simulation results to validate theoretical predictions.
Indicative Contents المحتويات الإرشادية	1- Mathematical Background: [6 hrs] a. Review of algebraic concepts and manipulations. b. Calculus techniques relevant to control systems, such as differentiation and integration. c. Linear algebra and matrix operations in control system analysis. 2- Control System Configurations: [6 hrs] a. Open loop and closed-loop control systems. b. Feedback and feedforward control architectures. c. Advantages and limitations of different control system configurations. 3- Block Diagram Reduction: [6 hrs] a. Block diagram representation of control systems b. Reduction techniques, including series, parallel, and feedback

	connections c. Simplification methods for complex block diagrams 4- Signal Flow Graphs: [10 hrs] a. Representation of control systems using signal flow graphs. b. Mason's gain formula for analyzing signal flow graphs. c. Determination of overall transfer function from a signal flow graph. 5- Time Response: [12 hrs] a. Analysis of transient and steady state responses of control systems. b. Time-domain specifications, such as rise time, settling time, and overshoot. c. Effects of system parameters on time response characteristics. 6- Stability of Control Systems: [8 hrs] a. Concepts of stability and instability in control systems. b. Routh-Hurwitz stability criterion. 7- Root Locus Analysis: [12 hrs] a. Root locus plots and their interpretation. b. Root locus design techniques for improving system performance and stability.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Interactive Lectures: • Incorporate interactive elements within lectures, such as asking questions, conducting polls, or initiating discussions. • Encourage students to actively participate by sharing their insights, answering questions, and engaging in debates related to the lecture topics. 2- Problem-Based Learning: • Present real-world control system problems and challenges that require frequency response analysis. • Divide students into groups and assign them specific problems to solve, allowing them to apply the concepts learned and critically analyze different approaches. 3- Case Studies and Examples: • Provide case studies and examples that demonstrate the practical applications of the response analysis. • Encourage students to analyze and discuss these case studies, applying their critical thinking skills to identify the underlying control system challenges and propose solutions. 4- Hands-on Experiments and Simulations: • Conduct hands-on experiments or simulations using software tools

	(e.g., MATLAB/Simulink) to explore the system response analysis. • Guide students through the process of setting up experiments, collecting data, and analyzing the response characteristics. 5- Group Projects: • Assign group projects that require students to analyze, and optimize control systems. • Encourage collaboration and critical thinking within the groups, promoting discussions on design decisions, trade-offs, and system performance. 6- Problem-Solving Sessions: • Conduct problem-solving sessions where students can bring their questions or challenges related to the system response analysis. • Guide students in analyzing the problems, identifying relevant concepts, and developing systematic problem-solving strategies.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	76	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	122		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects	1	10% (10)	13	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7

assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Control Engineering. (Contents, definitions and basic concepts)
Week 2	Mathematical Background (Laplace Transform, Partial Fraction Expansion and Inverse Laplace)
Week 3	Control System Basics (Control System Configurations, Analysis and Design Objectives, Understanding the Transfer Function (of SISO and MIMO) and the characteristic equation)
Week 4	Block diagram reduction (Typical Elements of Block Diagrams, Common topologies of reduction, Block Diagram Reduction via Familiar Forms, Block Diagram Reduction via Moving Blocks to Create Familiar Forms).
Week 5	Signal flow graph (SFG)- Part 1 Basic Elements of an SFG, SFG Algebra.
Week 6	Signal flow graph (SFG)- Part 2 (Mason Gain Rule).
Week 7	Signal flow graph (SFG)- Part 3 (Finding the system's transfer function using Mason rule)
Week 8	Time response- Part 1 (time response of continuous-data systems, typical test signals for the time response, The unit-step response and time-domain specifications)
Week 9	Time response- Part 2 (Steady-State Error of Linear Continuous-Data Control Systems).
Week 10	Time response- Part 3 (Transient response of 1st order systems, 2^{nd} and higher order Systems)
Week 11	Stability of control Systems (Routh Hurwitz Stability Criterion, basic Routh table)

Week 12	Stability of control Systems (Routh special cases)
Week 13	Root Locus Analysis- Part 1 (Define a root locus, State the properties of a root locus)
Week 14	Root Locus Analysis- Part 2 (Root locus plot, General rules of constructing)
Week 15	Root Locus Analysis- Part 3 (Root locus plot refining)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	N. Nise "Control Systems Engineering",.	Yes
Recommended Texts	B. Kuo, "Automatic Control System," 2010, 9th edition	No
Recommended Texts	K. Ogata, "Modern Control Engineering," 2010, 5th edition	No
Websites	https://www.youtube.com/@MATLAB/playlists	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Control**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	NVEEELI214				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIII		**Semester of Delivery**	Six	
Administering Department	NEE		**College**	EEC	
Module Leader	Shawkat mohammed younus		**e-mail**	shawkat.younus@uoninevah.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**	@uoninevah.edu.iq	
Scientific Committee Approval Date	/ /2023		**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	NEEI3312	**Semester**	5

Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of this course is to give the students the ability to analyze any control system by using different methods. This includes the analyses of the transient response, steady state response and most importantly the stability. In addition, they will have the ability to represent systems using different methods such as the transfer function and state space then choose the most related one. By the end of this course, students will be able to make full analysis for control systems and be ready for the design of the control systems in the next year.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	65. Recognize the principles of Analog control system analysis. 66. Summarize what is meant by root locus analysis. 67. Control system design by root locus method. 68. List the various terms associated with frequency response. 69. Summarize what is meant by frequency response analysis. 70. Discuss the reaction and involvement of gain and phase shift in frequency response analysis. 71. Study the methods used to describe the frequency response. 72. Define the Bode plot, its analysis, rules, and sketching steps. 73. Discuss the Bode plot Analytical method and its plotting steps. 74. Discuss the Frequency domain specifications. 75. Explain the stability criteria, find the gain margin, and phase margin and the design by the frequency method.. 76. Define the PID controller, its analysis, rules, and sketching steps. 77. Study the methods used to tuning the PID controller. 78. Recognize the principles of Digital control system analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Control Systems and Design [12 hrs] ❖ Overview of control systems and their importance. ❖ Introduction to frequency response analysis and its relevance.

	❖ Basic concepts of transfer functions and Laplace transforms. 2. Frequency Response Characteristics. [12 hrs] ❖ Magnitude response: gain, resonant frequencies and bandwidth. ❖ Phase response: phase shift, phase margin, phase crossover frequency. ❖ Gain/Phase margins: definition, significance, interpretation. 3. Bode plots [14 hrs] ❖ Introduction to Bode plots as a graphical representation of frequency response. ❖ Construction of Bode plots from transfer functions. ❖ Interpreting Bode plots for gain, phase, and stability analysis. 4. Frequency Response Analysis Techniques [12 hrs] ❖ Analytical methods: evaluating frequency response using algebraic manipulation. ❖ Numerical methods: using MATLAB for frequency response analysis. ❖ Experimental methods: measuring frequency response using experimental setupsStability Analysis using Frequency Response 5. Stability Analysis using Frequency Response [12 hrs] ❖ Stability criteria based on frequency response: gain and phase margins, stability bounds ❖ Relationship between frequency response and stability analysis. 6. Introduction to PID Controller [6 hrs] ❖ Basic concepts of PID controller ❖ Tuning methods: Open and Close methods. 7. Introduction to Digital control system. [6 hrs] ❖ Basic concepts of transfer functions and Z transforms

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	7- Interactive Lectures: • Incorporate interactive elements within lectures, such as asking questions, conducting polls, or initiating discussions. • Encourage students to actively participate by sharing their insights, answering questions, and engaging in debates related to the lecture topics. 8- Problem-Based Learning: • Present real-world control system problems and challenges that require frequency response analysis. • Divide students into groups and assign them specific problems to solve, allowing them to apply the concepts learned and critically analyze different approaches. 9- Case Studies and Examples: • Provide case studies and examples that demonstrate the practical applications

	of frequency response analysis. • Encourage students to analyze and discuss these case studies, applying their critical thinking skills to identify the underlying control system challenges and propose solutions. 10- Hands-on Experiments and Simulations: • Conduct hands-on experiments or simulations using software tools (e.g., MATLAB/Simulink) to explore frequency response analysis. • Guide students through the process of setting up experiments, collecting data, and analyzing the frequency response characteristics. 11- Group Projects: • Assign group projects that require students to analyze, and optimize control systems using frequency response techniques. • Encourage collaboration and critical thinking within the groups, promoting discussions on design decisions, trade-offs, and system performance. 12- Problem-Solving Sessions: • Conduct problem-solving sessions where students can bring their questions or challenges related to frequency response analysis. • Guide students in analyzing the problems, identifying relevant concepts, and developing systematic problem-solving strategies.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	76	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7

assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	CONTROL SYSTEM ANALYSIS BY THE ROOT-LOCUS METHOD: part 1
Week 2	CONTROL SYSTEM ANALYSIS BY THE ROOT-LOCUS METHOD: part 2
Week 3	CONTROL SYSTEM DESIGN BY THE ROOT-LOCUS METHOD: part 1
Week 4	CONTROL SYSTEM DESIGN BY THE ROOT-LOCUS METHOD: part 2
Week 5	CONTROL SYSTEM ANALYSIS BY THE FREQUENCY RESPONSE (BODE PLOT): part1
Week 6	CONTROL SYSTEM ANALYSIS BY THE FREQUENCY RESPONSE (BODE PLOT): part2
Week 7	CONTROL SYSTEM ANALYSIS BY THE FREQUENCY RESPONSE (BODE PLOT): part2
Week 8	CONT ROL SYSTEM DESIGN BY FREQUENCY RESPONSE: part 1
Week 9	CONT ROL SYSTEM DESIGN BY FREQUENCY RESPONSE: part 2
Week 10	PID CONTROLLER DESIGN: part1
Week 11	PID CONTROLLER DESIGN: part2
Week 12	CONTROL SYSTEM DESIGN IN STATE-SPACE :part1
Week 13	CONTROL SYSTEM DESIGN IN STATE-SPACE :part2
Week 14	DIGITAL CONTROL SYSTEMS: part1
Week 15	DIGITAL CONTROL SYSTEMS: part2
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to the control engineering by Using Matlab Programming.

Week 2	Lab 2: Study of finding the Transfer Function By Matlab Programming.
Week 3	Lab 3: Study of plotting the block diagram reduction By Matlab Programming.
Week 4	Lab 4: Study of applying the Mason rule using Matlab Programming
Week 5	Lab 5: Study of finding the transient response of 1^{st} order and 2^{nd} order system.
Week 6	Lab 6: Study of finding the steady state error.
Week 7	Lab 7: Plotting of the root locus.
Week 8	Lab 8: Control system design by root locus method Using Matlab Programming.
Week 9	Lab 9: Introduction to frequency response by Using Matlab Programming.
Week 10	Lab 10: Study of plotting the Bode plot By Matlab Programming.
Week 11	Lab 11: Study of finding Gain Margin and Phase Margin using Matlab Programming
Week 12	Lab 12: Control system design by frequency response method Using Matlab Programming
Week 13	Lab 13: Study of finding Gain of PID controller by Matlab Programming
Week 14	Lab 14: Pre-test preparation.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	N. Nise "Control Systems Engineering"	Yes
Recommended Texts	B. Kuo, "Automatic Control System," 2010, 9^{th} edition	No
Recommended Texts	K. Ogata, "Modern Control Engineering," 2010, 5^{th} edition	No
Websites	https://www.youtube.com/@MATLAB/playlists	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**DC Converters**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI321**				
ECTS Credits	**6**				
SWL (hr/sem)	**164**				
Module Level	13		**Semester of Delivery**	5	
Administering Department	Electronic Dept.		**College**	Electronics Collage	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Power Electronic Devices	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	26. Introduce the undergraduate students to the principle of semiconductor switch-based conversion in power electronics. 27. The analysis of power components and important factors when dealing with nonsinusoidal quantities. 28. Focus on the features and benefits of power electronics circuits and apricate its importance in modern electrical engineering systems such as energy processing and conditioning. 29. To introduce the features and characteristics the common power switching devices. 30. To introduce the single-phase and three-phase phase-controlled power converter circuits. 31. To relate the steady state and transient analysis of phase-controlled power converter circuits to the converter performance and design.
Module Learning Outcomes	57. By the completion of the course, the students should be able to: 58. Define the scope, tools types and applications of power converters. 59. Calculate the assess the figures of merits used to describe the quality of non-ideal waveforms in power electronics converters. 60. Describe the behavioral characteristics and ratings of power switching semiconductor devices such as diodes, Thyristors, MOSFETs and IGBTs. 61. Analyze single-phase and three-phase power diode circuits, evaluate input-output performance parameters with idealized load models. 62. Analyze single-phase and three-phase power SCR controlled rectifier circuits with various load models. 63. Describe and Analyze the single-phase and three-phase SCR-AC controller circuits with R and RL loads.
Indicative Contents	Indicative content includes the following.

	Part A- Phase-controlled DC-DC converters Phase Control Converters: Signal phase central taped transformer connection , half controlled and fully controlled Bridge configuration , three phase half controlled Bridge converters , Use of flywheeling diode operation with resistive , inductive and Back EMF load , line commutated inverter , effect of source inductance on converter performance , power factor , ripple factor calculation , firing scheme , linear alpha and cosine angle control , application of D.C motor speed control , regulated power supply , battery charger . Thyristor commutation techniques: Natural commutation, Force commutation, Voltage / Current commutation.

Learning and Teaching Strategies

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, report writing and scientific debate skills.

Student Workload (SWL)

Structured SWL (h/sem)	74	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	90	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**164**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction: Calculation of the switching losses.
Week 2	Power Computations: Definitions of chopper Circuit.
Week 3	Introduction to Buck converter
Week 4	Design of buck converter
Week 5	Buck converter operation with RL load
Week 6	Introduction to Boost converter
Week 7	Design of boost converter
Week 8	Boost converter operation with RL load

Week 9	Introduction to Buck-Boost converter
Week 10	Design of Buck-Boost converter
Week 11	Buck-Boost converter operation with RL load
Week 12	Introduction to Cuk converter
Week 13	Design of Cuk converter
Week 14	Cuk converter operation with RL load
Week 15	Preparatory week before the final Exam.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Power Electronics by Daniel W. Hart, ISBN 978-0-07-338067-4. McGraw Hill (2010)	No
Recommended Texts	-Power electronics Devices, circuits, and Applications (Fourth Edition) by Muhammad H. Rashid, ISBN 978-0-13-312590-0 , Pearson 2014 -Power Electronics Basics, by Yuriy Rozanov, Sergey Ryvkin, Evgeny Chaplygin and Pavel Voronin. ISBN 978-1-4822-9880-2, CRC Press 2016 -POWER CONVERTER CIRCUITS By Shepherd and	No

	Zhang ISBN: 0-8247-5054-3, Marcel Dekker 2004	
Websites	https://classroom.google.com	

Grading Scheme				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**DIGITAL SIGNAL PROCESSING**			**Module Delivery**	
Module Type	**Core**			**Theory** **☒ Lecture** **Lab** **☐X Tutorial** **☐ Practical** **☐ Seminar**	
Module Code	**EEMB31**				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Signal and system	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	32. To identify digital signal processing system. 33. To understand continuous, discrete, periodic and non-periodic signals. 34. To understand the transformation of signals and the different between them. 35. To perform spectrum of signals.
Module Learning Outcomes	64. Explain the function of each block in DSP system. 65. Covert the signals from continues to discrete form and then reconstruction. 66. Find impulse response, unit step response and difference equation 67. Define discrete Fourier series. 68. How can find the spectrum for periodic and non-periodic signals 69. Explain the different between transformation method. 70. Find and explain the equation of the transfer function in frequency domain 71. Define z-transform, region of convergence and the relationship between frequency and z-domain. 72. Find poles, zeros and the stability of transfer functions.
Indicative Contents	Indicative content includes the following. <u>Part A – block diagram of DSP system</u> Input signals, ADC, sampling, sampling frequency, maximum frequency, bit rate, number of bits, quantization, coding, SNR, reconstruction signals, anti-aliasing, output signals, Impulse and step responses, difference equations. [8 hrs] <u>Part B - transformations</u>

	Periodic and non-periodic signals, Fourier series, double side band spectrum. [4 hrs] Time-domain, frequency-domain, DTFT, IDTFT, magnitude and phase spectrum, DFT-N point and FFT, number of multiplication and addition, butterfly method, property of each transformation, transfer function. [24 hrs] z-transform, region of convergences, transfer function in z-domain, poles and zeros, stability, IZ-transform, long division, partial fraction, property of z-transform. [16 hrs]

Learning and Teaching Strategies	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

Structured SWL (h/sem)ل	50	**Structured SWL (h/w)** ا	4
Unstructured SWL (h/sem)	75	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	**125**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	٢, ٥, ٩,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Block diagram of DSP system
Week 2	Difference equations and impulse response
Week 3	Fourier Analysis
Week 4	Discrete-Time Fourier Transform
Week 5	DTFT Properties and IDTFT
Week 6	Transfer function in frequency domain
Week 7	Mid term
Week 8	DFT_N points transform and IDFT_N points
Week 9	Fast Fourier Transform and IFFT
Week 10	Fast Fourier Transform Properties and transfer function
Week 11	Z-transform and region of convergence
Week 12	Z-transform Properties
Week 13	Poles , zeros and stability of transfer function
Week 14	Inverse Z-transform
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Emmanuel and Barrie, “Digital Signal Processing practical Approach,”	Yes
Recommended Texts	1- 3.Li Tan and Jean Jiang, “Digital Signal Processing Fundamentals and Applications” 2- John G. Proakis, “Digital Signal Processing– Fourth Edition 2000	Yes

Grading Scheme				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION OF MICROPROCSSOR PROGRAMMING

وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Microprocessor Programming**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI215**				
ECTS Credits	**4**				
SWL (hr/sem)	**125**				
Module Level		3	**Semester of Delivery**		6
Administering Department		EEMB	**College**	College of Electronic Engineering	
Module Leader	Mohammed Muzahem Azeez		**e-mail**	mohammed.azeez@uoninevah.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		MSc
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**		1

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim is to study the software architecture of the 8086 microprocessor and how data are represented in computer memory. Study the instructions set of the microprocessor and write and run programs using assembly language.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	79. To understand the architecture of 8086 microprocessors'. 80. To understand how data are represented in computer memory. 81. To describe the addressing modes of 8086. 82. To program using the transfer data instructions of the 8086 83. To program using logical instructions of the 8086 84. To program using arithmetic instructions of the 8086 85. To program using shift and rotate instructions of the 8086 86. To understand how String instruction is implemented in 8086. 87. To write assembly programs using macro-assembler. 88. Write programs using fixed point arithmetic and solving equations and sorting problems 89. understand the structured programming using subroutine in assembly langua ge. 90. Write programs to solve problems involve two dimension arrays and sorting al gorithms in assembly language.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Computer organization, data representatio n, the 8086 microprocessor architecture, and 8086 addressing modes. [16 hrs] Instructions set (data transfer, logical, shift and rotate, arithmetic and program control instructions). [20 hrs] 8086 assembly language programming, Implementing standard program structures in

	8086 assembly language, Instruction timing and delay loops, strings; procedures and macros, 8086 interrupts and interrupt applications. [20 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be focus on developing a conceptual understanding of the principle of microprocessor programming while refining students critical thinking skills. This will be achieved through classes, interactive tutorials, and by considering the type of simple experiments involving some interesting sampling activities for the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	50	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.33
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	20% (20)	4,7, 11	LO #1-9
	Assignments	2	5% (5)	3, 10	LO # 1-8
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	5% (5)	13	LO # 1 -9
Summative assessment	**Midterm Exam**	2 hr	10% (10)	9	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to microprocessor
Week 2	Data Representations
Week 3	8086 Architecture and 8086 Addressing Modes
Week 4	Data Transfer instructions
Week 5	Logical Instructions
Week 6	Arithmetic instructions
Week 7	Shift and rotate instructions
Week 8	Program control instructions and Subroutine instructions
Week 9	Mid-term Exam + review
Week 10	String Instructions
Week 11	Assembly language program Tiny model , Small model and
Week 12	Two Dimensional Arrays
Week 13	Interrupt instructions
Week 14	Sorting Algorithms
Week 15	Preparatory week before the final Exam
Week 16	Final exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-2	Debug program instructions 1
Week 3-4	Assembling and Executing Instruction with debug
Week 5-6	Addressing modes

Week 7-8	Transfer instructions
Week 9-10	Logical Instructions
Week 11-12	Shift and rotate instructions
Week 13-14	Arithmetic instructions

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	The Intel Microprocessors By BARRY B. BREY	Yes
Recommended Texts	The 8088 & 8086 microprocessors programming , interfacing S/W, H/W & applications , Prentice Hall, 2003 By W. A. Triebel & A. Singh	
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION OF MICROPROCSSOR APPLICATIONS

وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Microprocessor Applications**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NEEI412**				
ECTS Credits	**3**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**	7	
Administering Department	EEMB		**College**	College of Electronic Engineering	
Module Leader	Mohammed Muzahem Azeez		**e-mail**	mohammed.azeez@uoninevah.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	MSc	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**EEMB324**	**Semester**	6
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim is to learn how to implement 8086 microprocessor system, memory and input output, DAC and ADC interfacing. To know how to realize digital filter using microprocessor based system and control any system such stepper motor.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	91. To understand structure programming using subroutine in assembly language 92. To understand how delay subroutine 8086 microprocessor systems 93. To understand how Interrupt is implementing in 8086 microprocessor systems 94. To understand the control signals that are needed to implement the interface between the 8086 microprocessor and memory or input/output devices. 95. To implement Dos and Bios interrupts & software applications 96. To implement input-output interfacing with the 8086. 97. To implement memory interfacing with the 8086. 98. To implement DAC interfacing with the 8086. 99. To implement ADC interfacing with the 8086. 100. To implement PPI 8255 in 8086 microprocessor system. 101. To control Stepper motor using 8086 microprocessor system
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Review of 8086 microprocessors, 8086 hardware connections and input/output and memory interfacing. [30 hrs] Interfacing analog to digital converter, digital to analog converter, programmable peripheral interface and memory test. [25 hrs] Digital filter realization based microprocessor system, stepper motor control system and hardware and software applications. [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be focus on developing a conceptual understanding of the principle of microprocessor applications while refining students critical thinking skills.

	This will be achieved through classes, interactive tutorials, and by considering the type of simple experiments involving some interesting sampling activities for the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	50	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.33
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	20% (20)	4,7, 11	LO #1-6
	Assignments	2	5% (5)	3, 10	LO # 1-6
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	5% (5)	13	LO # 1 -8
Summative assessment	**Midterm Exam**	2 hr	10% (10)	9	LO # 1-5
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Review of 8086
Week 2	Interrupt is implementing in 8086 microprocessor system
Week 3	Dos and Bios interrupts & software applications
Week 4	Input and output interface
Week 5	8086 Microprocessor Bus Buffering and Latching
Week 6	Memory interface 1
Week 7	Memory interface 2
Week 8	Analog To Digital Converter Interfacing
Week 9	Digital To Analog Converter Interfacing
Week 10	Mid-term Exam + review
Week 11	Programmable peripheral Interface (PPI)82C55
Week 12	Stepper Motor Interfacing
Week 13	Implementation of Digital filter
Week 14	Microprocessor System Design Applications
Week 15	Preparatory week before the final Exam
Week 16	Final exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-2	Introduction to the MTS-86C microcomputer and File Transmission
Week 3-4	Simple input and output and 7-Segment display in MTS-86C
Week 5-6	Using String Instruction in MTS-86C
Week 7-8	Interrupts in MTS-86C
Week 9-10	Familiarity with Bios int 10h and Dos int 21h

Week 11-12	DAC
Week 13-14	ADC

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	The Intel Microprocessors By BARRY B. BREY	Yes
Recommended Texts	The 8088 & 8086 microprocessors programming , interfacing S/W, H/W & applications , Prentice Hall, 2003 By W. A. Triebel & A. Singh	
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information

Module Title	**Integrated Electronic**	**Module Delivery**	
Module Type	**core**	☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	NVEEELI313		
ECTS Credits	**5**		
SWL (hr/sem)	**165**		
Module Level	1	**Semester of Delivery**	1
Administering Department	Electronics	**College**	Electronic Engineering college
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Prof.	**Module Leader's Qualification**	PhD
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	Ahmad.younis@uoninevah,edu,iq
Scientific Committee Approval Date	12/06/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module	NEEI2322	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	66. To understand the advanced applications of op-amps 67. To be familiar with the different op-amp based communication circuits 68. To understand the operation and analysis of active filters 69. To illustrate different active filter design methods 70. To understand the concept of oscillation and its conditions 71. To be able to design and analyze of RC and LC oscillators 72. To study the operation of 555 timer and crystal oscillator 73. To be familiar with design and analyze tuned amplifier 74. To understand the power amplifier basic principles 75. To study and analyze power amplifier classes A, B, AB, and class C 76. To be familiar with basic concept of multivibrator 77. To understand different operation of multivibrators 78. Design and analysis of Astable, monostable, and bistable MV 79. To understand the operation of A/D and D/A converters
Module Learning Outcomes	102. Understand and apply op-amp applications 103. Deign different op-amp circuits application 104. Deal with different active filter design and analysis 105. Understanding the principle operation of sinusoidal oscillator 106. Design and analyze RC , LC, and crystal oscillators 107. Ability to design tuned amplifiers 108. Understanding various power amplifier classes 109. Design and analyze class A,B, AB, power amplifiers 110. Understanding the operation and analysis of Astable, monostable, and bistable circuits 111. To be familiar with A/D and D/A convertors.

Indicative Contents	**OP-AMP APPLICATIONS:** inverting, non-inverting amplifier, buffer, summing amplifier, difference amplifier, integrator and differentiator , comparator, sample and hold, zero crossing detector, peak detector, precision diode and fast rectifier, analog computation. **Active Filters:** filter approximations, passive RLC design, active filter design methods (ladder, and cascaded design technique). **OSCILLATORS :** Oscillation conditions ; Satiability concept Three pole amplifier ; Nyquist criteria ; Stabilizing networks ; frequency compensation and sinusoidal oscillator ; phase shift , Wien bridge , Colpitts , Hartley , Crystal and Tuned circuit type oscillator (AF &RF Range). **TUNED AMPLIFIER**: Introduction to single tuned amplifier ; G.B. response calculations & design ; Cascade amplifier ; **POWER AMPLIFIERS:** Introduction to Class A, B, AB, and C operation , Class A – common –emitter power amplifier ; Transformer coupled amplifier ; Class push –pull power amplifier ; Amplifiers using complementary symmetry ; Class C amplifier . **MULTIVIBRATORS:** basic concept, Astable operation,

	monostable operation, 555 timer, and bistable. Converters: A/D and D/A converters design topologies and analysis

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)

Structured SWL (h/sem)	74	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	90	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	164		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	٢, ٥, ٩,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7
	Projects / Lab.	6	20% (20)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1:30hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Inverting and non inverting op-amp amplifier, buffer op-amp
Week 2	Summing, difference, integrator, comparator, and sample and hold
Week 3	Precision diode, precision rectifier, peak detector, and analog computation
Week 4	Active filter principles
Week 5	Design and analysis of different active filters
Week 6	Basic oscillation concept, conditions, and analysis Frequency compensation and sinusoidal oscillator
Week 7	
Week 8	

Week 9	RC phase shift oscillator LC and crystal oscillator
Week 10	Tuned amplifier aedign and analysis
Week 11	Power amplifier basic operation and principles
Week 12	Class A series fed and transformer coupled power amplifler
Week 13	Class B and AB
Week 14	Power amplifier distortion analysis
Week 15	Multivibrators Astable, monostable and bistable
Week 16	**A/D and D/A convertors.**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1-15	**Practical experiments in transistor op-amp applications** **To measure and to verify active filters and oscillators,** **To measure the performance of power amplifier classes**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Electronic Devices By Millmann Electronic Devices By Floyd	yes
Recommended Texts	Microelectronics by Millmann	Yes
Websites	Electronic circuits	

Grading Scheme				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Measurements**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI325**				
ECTS Credits	**5**				
SWL (hr./sem)	**136**				
Module Level		3	**Semester of Delivery**		6
Administering Department		Electronic Dept.	**College**	Collage of Electronics Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1. To understand what is the electrical measurements. 2. To learn what is instrumentation system. 3. To know what are the sources of errors in electrical measurements and how to fix them. 4. To familiarize the students to various types of measuring instruments and their performance characteristics. 5. To design the multi-range ammeters, voltmeters and ohmmeters for both AC and DC circuits. 6. To learn the bridges and their types and how to use them in electrical measurements. 7. To know the oscilloscopes and their applications 8. To explain what are the transducers and their types and their usage in measurements.
Module Learning Outcomes	Student is able to understand the basic principles of measuring instruments related to Electrical Engineering and choose a proper measuring instrument suitable for any given application taking into consideration the operating conditions
Indicative Contents	Indicative content includes the following. **<u>Part A – Electrical Measurement Principle</u>** Basics, instruments classifications, linearity, Errors. Units [12 hrs.] Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.]

	Part B- Electromechanical instruments Principle work, Torques types, PMMC, multi-range voltmeters, ammeters, ohmmeters, rectifier type voltmeter. [10 hrs.] Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.] Mid-term exam [2 hr.] **Part C- Oscilloscope and bridges** Oscilloscopes and their applications, DC and AC bridges. [12 hrs.] Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.] **Part D- Transducers** Transducers, types applications. [8 hrs.] Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.] Final exam [3 hrs]
Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials.

Student Workload (SWL)			
Structured SWL (h/sem)	46	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	90	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	136		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	20% (20)	3,6,11and13	LO #1, 5, 8 and 9
	Assignments	10	20% (20)	3 to 12	LO #1, 2, 4, 6 7, 8,9,10 and 12
	Projects / Lab.			----	----
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	10% (10)	9	LO # 1-8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Basic Concept of electrical measurements, what are the Instrument, Resolution. Accuracy, Precision, etc. What are the instrumentation system with some example
Week 2	Classification of measurements instruments, the linearity of measurements instruments.
Week 3	Units and system of units, SI units, fundamental and derived units
Week 4	Errors in electrical measurements, How to reduce them.
Week 5	Electromechanical instrument, How it is work, the torque types, Examples
Week 6	Permanent magnet moving coil PMMC, Multi-range Voltmeter and Ammeter design. Examples.
Week 7	Series and shunt ohmmeter design, voltmeter-ammeter method to resistance measurement. Examples.
Week 8	Rectifier type voltmeter. Examples.
Week 9	Mid-term exam
Week 10	Oscilloscope
Week 11	Oscilloscope applications
Week 12	Direct current bridges
Week 13	Alternative current bridges
Week 14	Transducers, their types, how to classify them.
Week 15	Resistance, inductive, capacitive change transducers
Week 16	Final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Electronic Instrumentation And Measurements Techniques by William David copper.	No
Recommended Texts	Electrical and Electronic Measurements by Dr. Ahmed A. Montaser	No
Websites		

Grading Scheme				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information

Module Title	**Microelectronics**	**Module Delivery**	
Module Type	**Core**	☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** **Practical** ☐ **Seminar**	
Module Code	NVEEELI324		
ECTS Credits	**5**		
SWL (hr/sem)	**165**		
Module Level	1	**Semester of Delivery**	1
Administering Department	Electronics	**College**	Electronic Engineering college
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Prof.	**Module Leader's Qualification**	PhD
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	Ahmad.younis@uoninevah,edu,iq
Scientific Committee Approval Date	12/06/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module	NEEI3313	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	80. To understand the basic integrated circuit classifications and technologies 81. To focus and concentrate on integrated circuit fabrication process 82. To concentrate on VLSI design and applications 83. To illustrate various analog and digital integrated circuit realizations 84. To understand the bipolar logic families (RTL, TTL, ECL, I^2L) 85. To understand and analyze CMOS logic families 86. To illustrate IC design methodologies 87. To have a basic principle of FPGA and ASIC integrated circuits.
Module Learning Outcomes	112. Familiar with integrated circuit technology 113. Following the rapid advance in IC process 114. Understand the operation of analog and digital IC 115. Ability to deal with various IC technology 116. Able to deal bipolar and MOS logic families 117. Understanding the performance of IC 118. To understand the IC design criterions.
Indicative Contents	**Integrated Circuit fabrication processes :**Crystal growth, diffusion, doping, evaporations, and photo masking, Ion implementation, Thin and thick film fabrication, sputtering, mounting, package, and hybrid integrated circuits**.** **LSI and VLSI Design and Application :** Discrete device design, bipolar transistor fundamental, technology, and miniaturization. Linear I.C's: fabrication, and general consideration. Current sources,. LSI oriented bipolar technology. Logic Families based on bipolar transistor (RTL, DTL, TTL, ECL, TRL, I^2 L). TTL gate circuit analysis. Metal- Semiconductor junction, Metal-Oxide Semiconductor junction. FET theory and analysis. **MOS Transistor Fundamentals and MOS I.C Technology :** MOS capacitor, static characteristics of the MOS transistor, MOS device

	fabrication. MOSFET's. Logic circuits based on MOSFET, PMOS, NMOS, CMOS,DMOS, SOS, VMOS. NMOS inverter and gate circuit analysis. CMOS inverter and gate circuit analysis. Charge-coupled devices and non-volatile memory devices, software applications. **ASIC Design methodologies and system design consideration** **LCA, Standard cell, Gate array, Structured array, FPGA**

Learning and Teaching Strategies	
Strategies	The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.

Student Workload (SWL)			
Structured SWL (h/sem)	46	**Structured SWL (h/w)**	2
Unstructured SWL (h/sem)	90	**Unstructured SWL (h/w)**	1
Total SWL (h/sem)	136		

Module Evaluation

		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	10% (10)	٢, ٥, ٩,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7

	Projects / Lab.	6	20% (20)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1:30hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	IC fabrication process
Week 2	Ion implantation, thin and thick film techniques
Week 3	Passive and active components fabrication
Week 4	Discrete device design, bipolar transistor miniaturization
Week 5	Bipolar logic families RTL, ECL, TTL
Week 6	I^2L logic, and gate circuit analysis
Week 7	Fundamental of MOS IC technology
Week 8	MOS logic circuits
Week 9	Charge coupled devices and MOS memory
Week 10	CMOS inverter analysis and characteristic
Week 11	ASIC design methodology
Week 12	IC system design consideration
Week 13	LCA and standard cell
Week 14	Gate array and structured array
Week 15	FPGA design
Week 16	**Subject review**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1-15	

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	**1: Microelectronics by Millmann** **2: SEMICONDUCTOR DEVICES & CIRCUITS", JOHN WILEY & SONS, 1992**.By : M.S. TYAGI	yes
Recommended Texts	**1-** PRINCIPLE OF CMOS VLSI DESIGN	No
Websites	Integrated circuits	

Grading Scheme				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Power Electronic Devices**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI311**				
ECTS Credits	**6**				
SWL (hr/sem)	**122**				
Module Level	1 3		**Semester of Delivery**	5	
Administering Department	Electronic Dept.		**College**	Electronics Collage	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Electronic Circuits	**Semester**	4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	36. Introduce the undergraduate students to the principle of semiconductor switch-based conversion in power electronics. 37. The analysis of power components and important factors when dealing with nonsinusoidal quantities. 38. Focus on the features and benefits of power electronics circuits and apricate its importance in modern electrical engineering systems such as energy processing and conditioning. 39. To introduce the features and characteristics the common power switching devices. 40. To introduce the single-phase and three-phase phase-controlled power converter circuits. 41. To relate the steady state and transient analysis of phase-controlled power converter circuits to the converter performance and design.
Module Learning Outcomes	73. By the completion of the course, the students should be able to: 74. Define the scope, tools types and applications of power converters. 75. Calculate the assess the figures of merits used to describe the quality of non-ideal waveforms in power electronics converters. 76. Describe the behavioral characteristics and ratings of power switching semiconductor devices such as diodes, Thyristors, MOSFETs and IGBTs. 77. Analyze single-phase and three-phase power diode circuits, evaluate input-output performance parameters with idealized load models. 78. Analyze single-phase and three-phase power SCR controlled rectifier circuits with various load models. 79. Describe and Analyze the single-phase and three-phase SCR-AC controller circuits with R and RL loads.
Indicative Contents	Indicative content includes the following. <u>Part A – Introduction, definitions and tools</u> Power Electronics: definitions, approach and applications. Figures of Merits: Ripple factor, Total harmonic distortion, Form factor, Power factor (non-sinusoidal waveform), conversion efficiency. Review of circuit analysis tools.

	Quizzes Part B- Semiconductor Switching Devices Scope of power electronics, power converter specification. Power Semiconductor Devices: Thyristor families, V-I characteristics of SCR, Triac, GTO, Diac, Source of thyristor triggering, turn On \ turn Off characteristic and Gate triggering requirements, series/parallel operation, device ratings. Power transistor devices: Basic structure and V-I characteristics of power MOSFET, IGBT, SIT. Switching characteristic, Gate/Base drive circuits, Safe operating area, di/dt / dv/dt limitation, series/parallel operation, ratings. Part C- Phase-controlled AC-DC converters Phase Control Converters: Signal phase central taped transformer connection , half controlled and fully controlled Bridge configuration , three phase half controlled Bridge converters , Use of flywheeling diode operation with resistive , inductive and Back EMF load , line commutated inverter , effect of source inductance on converter performance , power factor , ripple factor calculation , firing scheme , linear alpha and cosine angle control , application of D.C motor speed control , regulated power supply , battery charger . Thyristor commutation techniques: Natural commutation, Force commutation, Voltage / Current commutation.

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, report writing and scientific debate skills.

Student Workload (SWL)			
Structured SWL (h/sem)	46	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	76	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**122**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction: Definitions, Power and Energy, Types of Conversion, Power Electronics Approach. The role of switch in power converter, Energy recovery.

Week 2	Power Computations: Mean, RMS, Figures of Merits
Week 3	Power Diodes: Steady-state characteristics, basic parameters and ratings, transient characteristics, Special Diodes.
Week 4	SCRs: Steady-state characteristics, basic parameters and ratings, controlling SCR by gate pulses.
Week 5	Source of thyristor triggering, turn On\ turn Off characteristic and Gate triggering requirements.
Week 6	Power transistor devices: Basic structure and V-I characteristics of power IGBT. Switching characteristic, Gate/Base drive circuits, Safe operating area, di/dt / dv/dt limitation, series/parallel operation, ratings.
Week 7	Power transistor devices: Basic structure and V-I characteristics of power MOSFET.
Week 8	SCRs: Steady-state characteristics, basic parameters and ratings, controlling SCR by gate pulses.
Week 9	Half-wave diode rectifiers: R-load, RL-Load, freewheeling diode and capacitor filter.
Week 10	Full-Wave diode rectifier R, RL load and freewheeling diode.
Week 11	Controlled Full-Wave rectifier R, RL load and freewheeling diode.
Week 12	Three-phase three-pulse rectifier
Week 13	Six-pulse diode rectifier with R and highly inductive load
Week 14	Analysis of six-pulse diode rectifier with RLE load
Week 15	Preparatory week before the final Exam.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Power Electronics by Daniel W. Hart, ISBN 978-0-07-338067-4. McGraw Hill (2010)	No
Recommended Texts	-Power electronics Devices, circuits, and Applications (Fourth Edition) by Muhammad H. Rashid, ISBN 978-0-13-312590-0 , Pearson 2014 -Power Electronics Basics, by Yuriy Rozanov, Sergey Ryvkin, Evgeny Chaplygin and Pavel Voronin. ISBN 978-1-4822-9880-2, CRC Press 2016 -POWER CONVERTER CIRCUITS By Shepherd and Zhang ISBN: 0-8247-5054-3, Marcel Dekker 2004	No
Websites	https://classroom.google.com	

Grading Scheme				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors

	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	**F** – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information

Module Title	**AC Converters**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI311**		
ECTS Credits	**6**		
SWL (hr/sem)	**189**		
Module Level	4	**Semester of Delivery**	7
Administering Department	Electronic Dept.	**College**	Electronics Collage
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules

Prerequisite module	DC Converters	**Semester**	6
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	42. Introduce the undergraduate students to the principle of semiconductor switch-based conversion in power electronics. 43. The analysis of power components and important factors when dealing with nonsinusoidal quantities. 44. Focus on the features and benefits of power electronics circuits and apricate its importance in modern electrical engineering systems such as energy processing and conditioning. 45. To introduce the features and characteristics the common power switching devices. 46. To introduce the single-phase and three-phase phase-controlled power converter circuits. 47. To relate the steady state and transient analysis of phase-controlled power converter circuits to the converter performance and design.
Module Learning Outcomes	80. By the completion of the course, the students should be able to: 81. Define the scope, tools types and applications of power converters. 82. Calculate the assess the figures of merits used to describe the quality of non-ideal waveforms in power electronics converters. 83. Describe the behavioral characteristics and ratings of power switching semiconductor devices such as diodes, Thyristors, MOSFETs and IGBTs. 84. Analyze single-phase and three-phase power diode circuits, evaluate input-output performance parameters with idealized load models. 85. Analyze single-phase and three-phase power SCR controlled rectifier circuits with various load models. 86. Describe and Analyze the single-phase and three-phase SCR-AC controller circuits with R and RL loads.
Indicative Contents	Indicative content includes the following. <u>Part A- Semiconductor Switching Devices</u>

	Scope of power electronics, power converter specification. Power Semiconductor Devices: Thyristor families, V-I characteristics of SCR, Triac, GTO, Diac, Source of thyristor triggering, turn On \ turn Off characteristic and Gate triggering requirements, series/parallel operation, device ratings. Power transistor devices: Basic structure and V-I characteristics of power MOSFET, IGBT, SIT. Switching characteristic, Gate/Base drive circuits, Safe operating area, di/dt / dv/dt limitation, series/parallel operation, ratings. Part B- Phase-controlled DC-AC and AC-AC converters Phase Control Converters: Signal phase central taped transformer connection , half controlled and fully controlled Bridge configuration , three phase half controlled Bridge converters , Use of flywheeling diode operation with resistive , inductive and Back EMF load , line commutated inverter , effect of source inductance on converter performance , power factor , ripple factor calculation , firing scheme , linear alpha and cosine angle control , application of D.C motor speed control , regulated power supply , battery charger . Thyristor commutation techniques: Natural commutation, Force commutation, Voltage / Current commutation.

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, report writing and scientific debate skills.

Student Workload (SWL)

Structured SWL (h/sem)	74	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	115	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**189**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	DC to AC converters
Week 2	Principle of single-phase voltage source inverter, Half-Bridge inverter.

Week 3	Principle of single-phase voltage source inverter, Full-Bridge inverter.
Week 4	Principle of single-phase voltage source inverter with RL load.
Week 5	Principle of three-phase voltage source inverter, 180˚ Conduction mode.
Week 6	Principle of three-phase voltage source inverter, 180˚ Conduction mode.
Week 7	Principle of three-phase voltage source inverter, 120˚ Conduction mode.
Week 8	Multilevel inverters.
Week 9	Principle of Five and seven level inverters.
Week 10	AC-AC converters.
Week 11	Single-phase AC voltage converter.
Week 12	Three-phase AC voltage converter.
Week 13	Matrix converter.
Week 14	Cycloconverter.
Week 15	Preparing for Final Exam.

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Power Electronics by Daniel W. Hart, ISBN 978-0-07-338067-4. McGraw Hill (2010)	No
Recommended Texts	-Power electronics Devices, circuits, and Applications (Fourth Edition) by Muhammad H. Rashid, ISBN 978-0-13-312590-0 , Pearson 2014 -Power Electronics Basics, by Yuriy Rozanov, Sergey	No

	Ryvkin, Evgeny Chaplygin and Pavel Voronin. ISBN 978-1-4822-9880-2, CRC Press 2016 -POWER CONVERTER CIRCUITS By Shepherd and Zhang ISBN: 0-8247-5054-3, Marcel Dekker 2004	
Websites	https://classroom.google.com	

Grading Scheme

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Renewable Energy Systems**			**Module Delivery**	
Module Type	**Core**			• ☐ **Theory** • ☒**Lecture** • ☐**Lab** • ☒**Tutorial** • ☐**Practical** • ☐**Seminar**	
Module Code	**NEEI4315**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	4		**Semester of Delivery**		1
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	• An understanding of basic of the conventional electrical power generation. • An understanding of basic renewable energy systems. • An understanding the comparation between the conventional and renewable energy power plants. • Utilize the tools, materials, techniques, and technical processes of engineering and technology when solving technical problems. • identify energy conversion processes and their relation to engineering and technology • This course gives a basic knowledge of a number components used in the development of renewable energy systems. • This module demonstrate an ability to use critical thinking and problem-solving skills to evaluate business energy use and how and when to apply renewable energy solutions. • An understanding of basic of the smart grid.
Module Learning Outcomes	• Understand and use for problem solving main concepts of electric power calculations for one and three phase systems: complex power, power factor, power triangle, power quality and harmonic distortion. • Understand the concept of fuel cells. Calculate efficiency, fuel consumption and electric parameters of a simple fuel cell. • Students will be able to understand selected renewable energy sources. • Students will be able to understand the design photovoltaic energy system. • Students will be able to understand the design wind energy system. • Students will be able to understand the use of energy storage devices. • Students will be able to understand integration of renewable energy sources into utility grid. • Students will be able to explain application of renewable energy for distributed generation.
Indicative Contents	1. Introduction to the conventional electrical power generation. Classification of the conventional electrical power generation (Thermah power plant- Gas power plant- Nuclear power plant) 2. Introduction of Renewable Energy Sources. Energy Scenario: Classification of renewable Energy Sources, Energy resources (PV plant- wind turbin- Hydro power plant- Tidal energy- Geothermal energy- Bio energy). 3. Comparion between the conventional and renewable power plants.

	(Conventional and nonconventional) 4. Photovoltaic Energy System Solar Energy: Solar thermal Systems: Types of collectors, Collection systems, efficiency calculations, applications. Photo voltaic (PV) technology: Present status, solar cells, cell technologies, characteristics of PV systems, equivalent circuit, array design , building integrated PV system, its components , sizing and economics. Peak power operation. Standalone and grid interactive systems. [4 hrs] 5. Wind Energy System Wind Energy: Wind speed and power relation, power extracted from wind, wind distribution and wind speed predictions. Wind power systems: system components, Types of Turbine, Turbine rating. Choice of generators, turbine rating, electrical load matching, Variable speed operation, maximum power operation, control systems, system design features, stand alone and grid connected operation. Small Hydro Systems [3 hrs] 6. Energy Storage Devices Energy storage and hybrid system configurations: Energy storage, Battery – types, equivalent circuit, performance characteristics, battery design, charging and charge regulators. Battery management. Flywheel-energy relations, components, benefits over battery. Fuel Cell energy storage systems. Ultra Capacitors. Bio-Mass and Bio-Fuels. [3 hrs] 7. Integration of Renewable Energy Sources Grid Integration: Stand alone systems, Concept of Micro-Grid and its components, Hybrid systems – hybrid with diesel, with fuel cell, solar-wind, wind –hydro systems, mode controller, load sharing, system sizing. Hybrid system economics, Interface requirements, Stable operation, Transient-safety, Operating limits of voltage, frequency, stability margin, energy storage, and load scheduling. Effect on power quality, harmonic distortion, voltage transients and sags, voltage flickers, dynamic reactive power support. Systems stiffness. [2 hrs] 8. Distributed Generation [2 hrs] 9. Smart grid and virtual power plant (VPP).

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)	81	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	44	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	**125**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #5,
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #7 and #8
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction of Conventional and Renewable Energy Sources and compartion between them.
Week 3-5	Photovoltaic Energy System
Week 6-8	Wind Energy System
Week 9-11	Energy Storage Devices
Week 12-13	Integration of Renewable Energy Sources
Week 14-15	Distributed Generation, Smart grid and Virtual power plant.

Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	John Twidell and Tony Weir, "Renewable Energy Resources", 3st Edition, CRC Press, USA, 2015.	No
Recommended Texts	Robert Ehrlich, "Renewable Energy: A first course", CRC Press, 1st Edition, CRC Press, USA, 2013.	No
Websites	https://www.coursera.org	

Grading Scheme
مخطط الدرجات

Group	**Grade**	**التقدير**	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	**امتياز**	90 - 100	Outstanding Performance
	B - Very Good	**جيد جدا**	80 - 89	Above average with some errors
	C - Good	**جيد**	70 - 79	Sound work with notable errors
	D - Satisfactory	**متوسط**	60 - 69	Fair but with major shortcomings
	E - Sufficient	**مقبول**	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	**راسب (قيد المعالجة)**	(45-49)	More work required but credit awarded
	F – Fail	**راسب**	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Communication principles**			**Module Delivery**	
Module Type	**Base**			☐ **Theory**	
Module Code	**NVEEELI222**			☒ **Lecture**	
				☐ **Lab**	
ECTS Credits	**٤**			☒ **Tutorial**	
SWL (hr/sem)				☐ **Practical**	
				☐ **Seminar**	
Module Level	1	**Semester of Delivery**	7		
Administering Department	Type Dept. Code	**College**	Type College Code		
Module Leader	Dr. Ehab Isam Dawood Al-rawachy-	**e-mail**	**Ehab.dawood@uoninevah.edu.iq**		
Module Leader's Acad. Title	Lectural.	**Module Leader's Qualification**	Ph.D.		
Module Tutor		**e-mail**			
Peer Reviewer Name	Name	**e-mail**	E-mail		
Scientific Committee Approval Date	15/10/2023	**Version Number**	1.0		

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	The aim of this module is to help students to understand principles of communications engineering. In this course, they can start to learn the fundamental of communication. This basis start with detailed knowledge of transmission lines and Analogue communications, the later include amplitude modulations and angle modulation. The module develops an analytical approach of a communication system design to give students a basis of understanding a communication's background and they can continue to an advance communications engineering of the next course .
Module Learning Outcomes	Students will be able to: 1. Explain the theory of Transmission line and their equivalent circuit's representation. 2. Realize the difference between matching and mismatching scenario in of Transmission line. 3. Understand the difference between the lossless and lossy transmission lines cases. Using zigzag diagram to show the incident and the reflected waves, plot the voltage and the current at the load. 4. Understand the input impedance and their calculations. 5. Use the smith chart to find and approximated values and compare it with the calculations. 6. Solve the mismatch case in a transmission line using stubs. 7. Understand the analogue modulations theory, the importance and their types. 8. Explain the AM transmitters, equations, plot the spectrum of the generated AM signal and the development of each AM type. 9. Learn the modulation index and it's effect on the Am signal. 10. Explain the AM receivers, equations and the development of each type. 11. Understand the importance of an Angle modulations and their types 12. Explain the FM transmitters, generation of the FM signal using direct and indirect methods. 13. explain the narrow band and wide band FM signal and plot their spectrum. 14. Learn the importance of FM modulation index and it's effect on the Fm signal. 15. Explain the FM receivers, equations and the development of each type.

Indicative Contents	**Indicative content includes the following:-** **Transmission lines:** Equivalent circuit, characteristic impedance, phase velocity, reflection coefficient, standing waves, quarter – wave transformer, smith chart calculat stub matching. **Amplitude Modulation** ; Equation for AM, modulation index, spectrum of AM, DSB transmission with and without carriers, VSB transmission, DSB amplitude modulators, Envelope detectors, Balanced Modulator, SSB signal generation and Demodulation schemes. **Frequency modulation**: Equations for FM, modulation Index, spectrum calculation for sinu waveform and Bessels function table, phase modulation, relationship between FM and PM, frequency modulators (Armstrong method) Types of noise in AM and FM systems.

Learning and Teaching Strategies	
Strategies	To make students familiar with the principles of Communications, the effect of transmission line to the communication system. Students will be familiar with the theory of Analogue Communication systems. students can use their acquired knowledge in the class and apply it at the laboratory to do an experiment easier. Also, they can collect their reading and analyze it based on their theory behind.

Student Workload (SWL)			
Structured SWL (h/sem)		**Structured SWL (h/w)**	
Unstructured SWL (h/sem)		**Unstructured SWL (h/w)**	
Total SWL (h/sem)			

Module Evaluation				
	Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	6	10% (10)	٢, ٥, ٩,12,13,15	LO #1, 2, 10 and 11
	Assignments	6	10% (10)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7
	Projects	6	20% (20)	٢, ٥, ٩,12,13,15	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	0% (0)	0	
Summative assessment	**Midterm Exam**	1.5hr	20% (20)	10	LO # 1-4
	Final Exam	3hr	40% (40)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction To a communications System, a detailed Introduction to transmission line.
Week 2	derivation of lossless transmission line, Study the zig-zag diagram.
Week 3	Study A Lossy Transmission Lines with NO Refection (Matching case), Study the Interference and Standing Waves Patterns
Week 4	Study the Transmission Lines with Reflection. Derive the Input Impedance of lossy Transmission Lines.
Week 5	Study The Complex Reflection coefficient ($\boldsymbol{KR}$) for Lossless TL, introduction Impedance Matching
Week 6	**Smith Chart**
Week 7	An introduction to Smith Chart Learn how to use it.
Week 8	Learn of a Quarter Wave Transformer for Complex Load, Parallel Matching Using Single Stub.
Week 9	**Amplitude Modulation:**
Week 10	introduction to a modulation, Explain the AM transmitters, equations, plot the spectrum of the
Week 11	generated AM signal and the development of each AM type. Learn the modulation index and it's
Week 12	effect on the Am signal. Explain the AM receivers, equations and the development of each type
Week 13	**Angle Modulation:**
Week 14	Understand the importance of an Angle modulations and their types, Explain the FM
Week 15	transmitters, generation of the FM signal using direct and indirect methods. explain the narrow
Week 16	band and wide band FM signal and plot their spectrum. Learn the importance of FM modulation index and it's effect on the Fm signal. Explain the FM receivers, equations and the development of each type.

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Fundamental of applied electromagnetic b fawaz T. vilaby Arabic book "Communication Principles" by Dr. Sami AbdulMawjood, Dr.Khalil Hasan Said Mariyee, and Dr. Bayez Alslevani) Introduction to Communication System By Stremler Introduction to Analog and Digital Communication System By Haykin	
Recommended Texts	Communication Systems Engineering 2nd-5th Editions by Praokis	
Websites		

Grading Scheme

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information

Module Title	**Industrial Electronics**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NEEI3311**		
ECTS Credits	**6**		
SWL (hr/sem)	**189**		
Module Level	4	**Semester of Delivery**	7
Administering Department	Electronic Dept.	**College**	Electronics Collage
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules

Prerequisite module	Power Electronics	**Semester**	6
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	48. Introduce the undergraduate students to the principle of Ac to DC conversion in power electronics. 49. The analysis of power components and important factors when dealing with sinusoidal and nonsinusoidal quantities. 50. Focus on the features and benefits of power inverters and appreciate its importance in modern electrical engineering systems such as energy processing and conditioning. 51. To introduce the features and characteristics the power inverters devices. 52. To introduce the single-phase and three-phase phase-inverters circuits.
Module Learning Outcomes	87. By the completion of the course, the students should be able to: 88. Define the scope, tools types and applications of power inverters. 89. Calculate the assess the figures of merits used to describe the quality of non-ideal waveforms in power electronics inverters. 90. Describe the behavioral characteristics and ratings of power switching semiconductor devices such as diodes, Thyristors, MOSFETs and IGBTs. 91. Analyze single-phase and three-phase power inverter circuits, evaluate input-output performance parameters with idealized load models. 92. Analyze single-phase and three-phase power inverter circuits with various load models. 93. Describe and Analyze the single-phase and three-phase inverters circuits with R and RL loads.
Indicative Contents	Indicative content includes the following. Part A- Semiconductor Switching Devices Scope of power electronics, power converter specification. Power Semiconductor Devices: Thyristor families, V-I characteristics of SCR, Triac, GTO, Diac, Source of thyristor triggering, turn On \ turn Off characteristic and Gate triggering requirements, series/parallel operation, device ratings. Power transistor devices: Basic structure and V-I characteristics of power MOSFET, IGBT, SIT. Switching characteristic, Gate/Base drive circuits, Safe operating area, di/dt / dv/dt limitation, series/parallel operation, ratings. Part B- Phase-controlled DC-AC and AC-AC converters

	Phase Control Converters: Signal phase central taped transformer connection , half controlled and fully controlled Bridge configuration , three phase half controlled Bridge converters , Use of flywheeling diode operation with resistive , inductive and Back EMF load , line commutated inverter , effect of source inductance on converter performance , power factor , ripple factor calculation , firing scheme , linear alpha and cosine angle control , application of D.C motor speed control , regulated power supply , battery charger . Thyristor commutation techniques: Natural commutation, Force commutation, Voltage / Current commutation.

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, report writing and scientific debate skills.

Student Workload (SWL)			
Structured SWL (h/sem)	74	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	115	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**189**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	AC to DC converters
Week 2	Principle of single-phase voltage source inverter, Half-Bridge inverter.
Week 3	Principle of single-phase voltage source inverter, Full-Bridge inverter.
Week 4	Principle of single-phase voltage source inverter with RL load.
Week 5	Principle of three-phase voltage source inverter, 180˚ Conduction mode.
Week 6	Principle of three-phase voltage source inverter, 180˚ Conduction mode.

Week 7	Principle of three-phase voltage source inverter, 120˚ Conduction mode.
Week 8	Multilevel inverters.
Week 9	Principle of Five and seven level inverters.
Week 10	AC-AC converters.
Week 11	Single-phase AC voltage converter.
Week 12	Three-phase AC voltage converter.
Week 13	Matrix converter.
Week 14	Cycloconverter.
Week 15	Preparing for Final Exam.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Power Electronics by Daniel W. Hart, ISBN 978-0-07-338067-4. McGraw Hill (2010)	No
Recommended Texts	-Power electronics Devices, circuits, and Applications (Fourth Edition) by Muhammad H. Rashid, ISBN 978-0-13-312590-0 , Pearson 2014 -Power Electronics Basics, by Yuriy Rozanov, Sergey Ryvkin, Evgeny Chaplygin and Pavel Voronin. ISBN 978-1-4822-9880-2, CRC Press 2016 -POWER CONVERTER CIRCUITS By Shepherd and	No

	Zhang ISBN: 0-8247-5054-3, Marcel Dekker 2004	
Websites	https://classroom.google.com	

Grading Scheme				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information		
Module Title	**Microcontroller programming**	**Module Delivery**

Module Type	**Base**		☐ **Theory** ☒ **Lecture** X **Lab** **Tutorial** **Practical** ☐ **Seminar**
Module Code	**NVEEELI314**		
ECTS Credits	٤		
SWL (hr/sem)	**125**		

Module Level	4	**Semester of Delivery**	1
Administering Department	EI	**College**	NE
Module Leader	Sahar Lazim	**e-mail**	**sahar.qaddoori@uoninevah.edu.iq**
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	4/7/2023	**Version Number**	1.0

Relation with other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	**Comparing Microprocessors and Microcontrollers , The Z80 and MCS 51 , Microcontroller survey .** **Declare the architecture of MCS-51 family microcontrollers hardware, Input/output pin, ports and circuits, External memory interfacing, counter, timer, serial data input/output, Interrupts.** **Basic Assembly Language Programming Concept such as Addressing mode, External data, move, Code memory read – only data moves, Push and Pop opcodes, Data Exchanges, Logical operations, Arithmetic operations, Branching Instructions, Interrupts and Returns.** **Describe An MCS-51 Microcontroller Design such as Microcontroller Specification, External memory and Memory space Decoding, Expanding I/O , Memory map I/O , Memory address decoding, Testing the Design, Lookup table for the 8051, Serial data Transmission.**
Module Learning Outcomes	1. Understanding the Comparing between Microcontroller & microprocessor 2. understanding Microcontroller Hardware and Architecture 3. understanding Microcontroller memory organization 4. understanding how to Interface external memory to microcontroller 5. understanding the microcontroller Addressing modes 6. understanding 8051 Microcontroller Instruction Set & Types 7. understanding Microcontroller Timers 8. understanding Microcontroller Serial port 9. understanding Microcontroller interrupts
Indicative Contents	1. declare Introduction To Microcontroller 2. explain Microcontroller Hardware and Architecture 3. describe Microcontroller memory management 4. Interfacing external memory to microcontroller 5. learn Addressing modes 6. explain 8051 Microcontroller Instruction Set & Types 7. program Microcontroller Timers 8. program Microcontroller Serial port 9. program Microcontroller interrupts

Learning and Teaching Strategies	
Strategies	The core approach for imparting this module will revolve around motivating students to engage in practical exercises, while honing and broadening their critical thinking abilities. This will be achieved through classroom sessions, interactive tutorials, and the exploration of hands-on experiments related to engaging sampling activities that capture the students' interest.

Student Workload (SWL)			
Structured SWL (h/sem)	125	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	65	**Unstructured SWL (h/w)**	2
Total SWL (h/sem)	190		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	10% (10)	٢, 4, 5,6	LO #1, 2, 10 and 11
	Assignments	1	10% (10)	14	LO # 3, 4, 6 and 7
	Projects / Lab.	٠	٠	٠	LO # 3, 4, 6 and 7, 5, 8 and 10
	Report	0	٠	0	
Summative assessment	**Midterm Exam**	١.5hr/2	20% (20)	10	LO # 1-4
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**Introduction To Microcontroller**
Week 2	**Microcontroller Hardware and Architecture**
Week 3	**Microcontroller memory management, Registers & Bitmap**
Week 4	**Interfacing external memory to microcontroller**
Week 5	**Addressing modes**
Week 6	**8051 Microcontroller Instruction Set & Types**
Week 7	
Week 8	**Microcontroller Timers**
Week 9	
Week 10	
Week 11	**Microcontroller Serial port**
Week 12	
Week 13	
Week 14	**Microcontroller interrupts**
Week 15	
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1-15	The application of each part of the covered drawing subject theoretically and according to the weekly sequence of the curriculum in the AutoCAD laboratory **Note: By two hours a week**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1.**"The 8051 micro-controller" By I. Scott Mackenzie.**	yes
Recommended Texts	**2. "The 8051 Microcontroller, Architecture, Programming And Applications", Kenneth J. Ayala.**	No
Websites		

Grading Scheme

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance.
	B - Very Good	جيد جدا	80 - 89	Above average with some errors.
	C - Good	جيد	70 - 79	Sound work with notable errors.
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings.
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria.
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work is required, but credit is given.
	F – Fail	راسب	(0-44)	A significant amount of work is required.

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Microwave Engineering**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI324**				
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. An understanding of microwave waveguides, passive & active devices, tubes and network analysis. 2. To emphasizes the basic concepts and phenomenon, of Maxwell's equations, wave propagation, network theory, and related topics, as applied to modern microwave systems.. 3. To introduce the student to microwave engineering and applications. 4. To provide an understanding of a range of microwave engineering design techniques. 5. This course gives a basic knowledge of a number components used in the development of microwave systems. 6. This module covers the most commonly used microwave transmission lines and looks at transmission line design techniques.
Module Learning Outcomes	1. Explain different types of waveguides and their respective modes of propagation. 2. Explain working of microwave passive circuits such as isolator, circulator, Directional couplers, attenuators etc. 3. Describe and explain working of microwave tubes and solid state devices. 4. Appraise the breadth of applications of microwave engineering (communications, industrial processing, medical). 5. Interpret microwave measurements using a vector network analyser (VNA) and their outputs. 6. Apply microwave engineering techniques to solve problems encountered in industry. 7. Consolidate specialized knowledge in microwave engineering and RF circuit design. 8. Experimentally evaluate the performance of microwave components using

	microwave equipment. 9. Design microwave components and RF circuits. 10. Perform complex analytical calculations in microwave engineering and RF circuits.
Indicative Contents	Indicative content includes the following. Introduction to Microwave Engineering Introducing the concept of Microwave Engineering and its difference from other fields of science. in addition, various applications of devices and systems realized by applying Microwave Engineering principles will be explored. [3 hrs] Review of Electromagnetic Theory This review will focus on different theoretical and mathematical aspects of electromagnetic theory that are relevant to Microwave Engineering. [3 hrs] Microwave Rectangular and Circular Waveguides Introducing waveguides and their usage in microwave systems, solving Helmholtz equation in rectangular and cylindrical coordinates, applying the solution of Helmholtz equations to waveguides with rectangular and circular cross section. Solving for TE and TM modes and their propagation parameters, description of power flow in waveguides. [9 hrs] Microwave Network Analysis Impedance and equivalent voltages and currents, impedance and admittance matrices, the scattering matrix, ABCD network representation, practical measurements of S-parameters. [6 hrs] Microwave and RF Passive Components Power dividers, directional couplers, waveguide T-junctions. [9 hrs]

	Modeling of Active Components Large and small-signal BJT and FET models, measurement of active RF and microwave devices. [6 hrs]

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)	90	**Structured SWL (h/w)**	6
Unstructured SWL (h/sem)	60	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**150**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10,
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Various applications of Microwaves, Review of Maxwell's Equations
Week 2	Review of Electromagnetic Theory: (Plane wave incidence on boundaries, Reflection & transmission)
Week 3	Waveguide Theory
Week 4	Rectangular Waveguides
Week 5	Circular Waveguides

Week 6	S-parameters and the scattering Matrix
Week 7	Tee junctions & Magic Tee
Week 8	Attenuators, Directional couplers
Week 9	Propagation into Ferrites, Ferrites Devices
Week 10	Active Microwave Device, Two cavity Klystron
Week 11	Velocity Modulation, Power and Efficiency
Week 12	The Reflex Klystron, Power and frequency characteristics
Week 13	Passive Microwave Devices
Week 14	Varactor diodes, PIN diodes, BARITE & IMPATT diodes
Week 15	Microwave Transistor circuit
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Lab 1: S-parameter Theory and Filters
Week 2	Lab 2: Directional Coupler

Learning and Teaching Resources

	Text	**Available in the Library?**

Required Texts	"Microwave Circuits and devices" by Liao	Yes
Recommended Texts	"Microwave Engineering" by Pozar	No
Websites	https://www.coursera.org	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information

Module Title	**Power Electronic Applications**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**NVEEELI321**		
ECTS Credits	**6**		
SWL (hr/sem)	**164**		
Module Level	4	**Semester of Delivery**	8
Administering Department	Electronic Dept.	**College**	Electronics Collage
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules

Prerequisite module	AC Converters	**Semester**	7
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	53. Introduce the undergraduate students to the principle of semiconductor switch-based conversion in power electronics. 54. The analysis of power components and important factors when dealing with nonsinusoidal quantities. 55. Focus on the features and benefits of power electronics circuits and apricate its importance in modern electrical engineering systems such as energy processing and conditioning. 56. To introduce the features and characteristics the common power switching devices. 57. To introduce the single-phase and three-phase phase-controlled power converter circuits. 58. To relate the steady state and transient analysis of phase-controlled power converter circuits to the converter performance and design.
Module Learning Outcomes	94. By the completion of the course, the students should be able to: 95. Define the scope, tools types and applications of power converters. 96. Calculate the assess the figures of merits used to describe the quality of non-ideal waveforms in power electronics converters. 97. Describe the behavioral characteristics and ratings of power switching semiconductor devices such as diodes, Thyristors, MOSFETs and IGBTs. 98. Analyze single-phase and three-phase power diode circuits, evaluate input-output performance parameters with idealized load models. 99. Analyze single-phase and three-phase power SCR controlled rectifier circuits with various load models. 100. Describe and Analyze the single-phase and three-phase SCR-AC controller circuits with R and RL loads.
Indicative Contents	Indicative content includes the following. <u>Part A – Introduction, definitions and tools</u>

	Power Electronics: definitions, approach and applications. Figures of Merits: Ripple factor, Total harmonic distortion, Form factor, Power factor (non-sinusoidal waveform), conversion efficiency. Review of circuit analysis tools. Quizzes Part B- Semiconductor Switching Devices Scope of power electronics, power converter specification. Power Semiconductor Devices: Thyristor families, V-I characteristics of SCR, Triac, GTO, Diac, Source of thyristor triggering, turn On \ turn Off characteristic and Gate triggering requirements, series/parallel operation, device ratings. Power transistor devices: Basic structure and V-I characteristics of power MOSFET, IGBT, SIT. Switching characteristic, Gate/Base drive circuits, Safe operating area, di/dt / dv/dt limitation, series/parallel operation, ratings. Part C- Phase-controlled AC-DC converters Phase Control Converters: Signal phase central taped transformer connection , half controlled and fully controlled Bridge configuration , three phase half controlled Bridge converters , Use of flywheeling diode operation with resistive , inductive and Back EMF load , line commutated inverter , effect of source inductance on converter performance , power factor , ripple factor calculation , firing scheme , linear alpha and cosine angle control , application of D.C motor speed control , regulated power supply , battery charger . Thyristor commutation techniques: Natural commutation, Force commutation, Voltage / Current commutation.

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and

	expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, report writing and scientific debate skills.

Student Workload (SWL)

Structured SWL (h/sem)	74	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	90	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**164**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	[3,6,9,12]	LO (#1- #12)
	Assignments	1	10% (10)	14	LO #4, #7, #(10-13)
	Projects / Lab.	0	0% (0)		
	Report	1	10% (10)	12	LO #11
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	10	LO #(1-8)
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to Flexible AC Transmission Systems.
Week 2	Principle of shunt compensation.
Week 3	Thyristor-Controlled reactor and thyristor-switched capacitor.
Week 4	Static VAR compensator.
Week 5	Principle of series compensation.
Week 6	Thyristor-switched series capacitor and thyristor-controlled series capacitor.
Week 7	Series Static VAR compensator.
Week 8	Power Supplies: DC power Supplies.
Week 9	AC Power Supplies.
Week 10	Magnetic Design Considerations: Transformer design, DC inductor, and Magnetic saturation.
Week 11	Protection of Devices and Circuits: Cooling and Heat Sinks.
Week 12	Thermal Modeling of Power Switching Devices.
Week 13	Snubber Circuits.
Week 14	Electromagnetic Interference: Sources and Minimizing.
Week 15	Preparatory week before the final Exam.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Power Electronics by Daniel W. Hart, ISBN 978-0-07-338067-4. McGraw Hill (2010)	No
Recommended Texts	-Power electronics Devices, circuits, and Applications (Fourth Edition) by Muhammad H. Rashid, ISBN 978-0-13-312590-0 , Pearson 2014 -Power Electronics Basics, by Yuriy Rozanov, Sergey Ryvkin, Evgeny Chaplygin and Pavel Voronin. ISBN 978-1-4822-9880-2, CRC Press 2016 -POWER CONVERTER CIRCUITS By Shepherd and Zhang ISBN: 0-8247-5054-3, Marcel Dekker 2004	No
Websites	https://classroom.google.com	

Grading Scheme				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria

Fail Group **(0 – 49)**	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.